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l'alimentation  
Ontario

**SOIL AND WATER  
ENVIRONMENTAL ENHANCEMENT PROGRAM  
(SWEEP)**

**EVALUATION ASSESSMENT**

**Prepared for:  
Monitoring and Evaluation  
Committee  
Soil and Water Environmental  
Enhancement Program**

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## 1.0 INTRODUCTION

This report presents the results of the evaluation assessment of the Soil and Water Environmental Enhancement Program (SWEEP).

The main purposes of an evaluation assessment are to:

- . prepare a description of the program, its history, environment, and components, and to examine the linkages between the program's activities and objectives;
- . determine the evaluation issues that should be examined in the subsequent evaluation study;
- . define how evaluation issues may be addressed, including identification of research questions and data sources; and
- . outline several options for carrying out the evaluation study and recommend a preferred evaluation plan.

The evaluation assessment should ensure that the full evaluation study is focussed on the most important issues, and that the study is designed and carried out in a cost-effective way.

The evaluation assessment for SWEEP was conducted in three phases.

Phase I included the following tasks:

- . review of program documentation
- . interviews with program personnel (e.g., members of the Working Committee and Management Committee, sub-program managers, and consultants participating in program implementation)
- . development of program profile and logic model
- . development of sub-program profiles
- . development of a list of potential evaluation issues.

The evaluation issues, which were prioritized in consultation with SWEEP's Monitoring and Evaluation Committee, formed the basis for Phase II. The focus of Phase II was to define how each evaluation issue may be addressed by identifying:

- . research questions and data items for each evaluation issue;
- and



- . required data and information sources.

Phase II of the evaluation assessment also included a preliminary overview of optional evaluation plans.

In Phase III of the evaluation assessment, evaluation options were refined and compared and data sources specified in more detail. Finally, a preferred evaluation option was identified.

This report combines the results of all three phases of the evaluation assessment of SWEEP. The report is structured as follows:

- . Section 2 presents the profile for SWEEP along with sub-program summaries. (Detailed sub-program/component profiles are included in Appendix C.)
- . Section 3 documents the evaluation issues and their priorities
- . Section 4 describes research questions, data items and data sources for each evaluation issue; and
- . Section 5 presents evaluation options.

## **EXECUTIVE SUMMARY**

### **Background**

The Soil and Water Environmental Enhancement Program (SWEEP), a federal-provincial program designed to reduce the volume of phosphorus being transported to Lake Erie, consisted of seven sub-programs. The federal programs included: the Pilot Watershed Studies; the Technology Assessment Panel; the Conservation Information Bureau; and the Socio-economic Evaluation. Each sub-program was managed by a private sector contractor except the Socio-economic Evaluation.

The province of Ontario was responsible for: Local Demonstrations; Technical Assistance; and Soil Conservation Incentives. The two levels of government were jointly responsible for the Administration, Monitoring and Public Information sub-program.

SWEEP operated with the support and participation of four government ministries: Agriculture Canada; Environment Canada; the Ontario Ministry of Agriculture and Food; and the Ontario Ministry of the Environment.

The SWEEP objectives were:

1. To reduce phosphorus loading in the Lake Erie basin by 200 tonnes per year by 1990 from non-point agricultural cropland sources.
2. To maintain or improve the productivity of Southwestern Ontario agriculture by reducing or arresting erosion and other forms of soil degradation.

### **Evaluation Procedures**

The evaluation was conducted using an evaluation framework consistent with procedures specified by the Office of the Comptroller General, Treasury Board of Canada. The data used to conduct the evaluation come from program reports and interviews with 10 program staff, 25 key respondents, 5 contractors and a survey of 427 farmers. A sample of 800 farmers from the SWEEP area selected by Statistics Canada were mailed a questionnaire. In addition to 327 who returned questionnaires, 100 were interviewed on the telephone by Statistics Canada staff.

### **Research Findings**

The two major objectives were investigated utilizing 13 evaluation issues for which various research questions were developed. The major evaluation issues and conclusions are outlined below.

#### Phosphorus Loading

The issue of whether or not the target of reducing phosphorus loading in the SWEEP study area by 200 tonnes per year by 1990 was achievable with existing and technologies developed by SWEEP could not be resolved. The question was not answered because the Overview Model has yet to provide the necessary data and a decrease of that amount on over 400,000 hectares was next to impossible to achieve through conservation technologies alone.

It was found that while the phosphorus loading has been reduced in the SWEEP area, the 200 tonne per year objective was not met. Major measurement problems were experienced due to the lack of adequate rainfall events and the unavailability of the results of a farm survey.

#### Effects of Conservation Practices

The conservation practices promoted by SWEEP had a positive input on the agricultural productivity of the area. The measurement of the overall impact on the area was dependent upon measures of the adoption of various tillage practices. These data are not yet available.

#### Economic Impact

The Farm Level Economic Analysis data demonstrated that conservation tillage is less risky, provides a larger net income and reduces the cost of soil erosion when compared to conventional tillage on individual farms.

#### Information Creation

The SWEEP research activities, plus activities of the Conservation Information Bureau and extension personnel, have both created and disseminated a substantial volume of conservation information to farmers. The levels of awareness of and knowledge about conservation practices by farmers have increased since 1986.

#### Attitudes

The attitudes of farmers to soil and water conservation are believed to have become more positive.

### Impact of SWEEP

While it is difficult to demonstrate causality, it is believed that the program both increased knowledge and the adoption of conservation practices. Much of the information received by farmers comes from non-SWEEP sources who may be disseminating SWEEP generated research and other activities.

### Research and Expertise

The program increased research activity and the capability of the private sector. Many consultants acquired or updated their research skills, new equipment was developed and farmers became much more active in conducting research on their own farms.

### Unintended Effects

Few negative program effects were observed. There were unanticipated delays and difficulties in conducting the Pilot Watershed Studies. Several staff and key respondents commented that more information and greater cooperation occurred than anticipated.

### Organization and Management

The organizational structure which consisted of several committees did not provide adequate information flow or control. The lack of a single individual who had overall authority for the program and who could provide timely decisions was discussed. The contracting out procedures proved controversial and some difficulties arose. Suggestions for improved management systems were made.

### Cost Effectiveness and Changes

The program was found to be relatively cost effective given its innovative nature. A tighter management system and better communication might have increased efficiency. Concern was expressed regarding the opportunity to continue research in the Pilot Demonstration Watersheds and to utilize research skills developed during the program.

### Conservation Information Bureau

The CIB component was evaluated in greater detail than the other program components at the request of the client. Flaws

in and difficulties developing from the organizational structure and management procedures were identified. The control of the CIB was considered relatively weak due partly to the organizational structure and control procedures. It was determined that the CIB had created and disseminated a substantial volume of useful information. The adequacy of funding was discussed in view of a budget overrun.

## 2.0 PROGRAM DESCRIPTION

This section documents the program profile for SWEEP and summarizes sub-program profiles. The program and sub-program profiles were developed from a review of program documentation and interviews with program personnel (see Appendix A for list of people interviewed). Because some sub-programs are not yet in operation (i.e., Conservation Information Centre, Pilot Demonstration Watersheds), profiles are based on Terms of Reference, implementation plans and contractors' proposals.

### 2.1 SWEEP Objectives

SWEEP is a five year, \$30 million federal/provincial agreement to "spearhead a drive to reduce phosphorus loadings in the Lake Erie basin from cropland runoff and also reduce soil erosion and degradation seriously affecting the [southwestern] region" of Ontario (SWEEP, News Release, May 8, 1986). The official objectives of SWEEP are:

- . to reduce phosphorus loading in the Lake Erie basin by 200 tonnes per year by 1990 from non-point agricultural cropland sources;
- . to maintain or improve the productivity of Southwestern Ontario agriculture by reducing or arresting soil erosion and degradation (Canada/Ontario Agreement on Southwestern Ontario Soil and Water Quality Enhancement).

To achieve these objectives, SWEEP focuses on improving soil management and cropping practices. The overall objectives, therefore, are based on several intermediate objectives:

- . to increase awareness of soil and water quality issues within the farm community
- . to change attitudes towards soil and water conservation practices
- . to stimulate (permanent) adoption of conservation practices
- . to generate a base of knowledge which will support further introduction of conservation practices past the life of SWEEP.

The SWEEP area is indicated in Exhibit 2.1. It covers the southwestern portion of the province, including all of the counties of:

Essex	Oxford
Kent	Brant
Lambton	Waterloo
Elgin	Haldeman/Norfolk
Middlesex	

It also includes the southern portions of:

Huron	Wellington
Niagara	Hamilton/Wentworth
Perth.	

The exact northern boundary of the SWEEP area has not been confirmed as of March, 1987.

## 2.2 Program History and Environment

The SWEEP Agreement was signed in May, 1986. Expenditures under the provincial sub-programs began in FY1985/86 and are scheduled to terminate in 1990. In November, 1986, federal sub-programs were reprofiled; funding was extended (but not increased) to June, 1993.

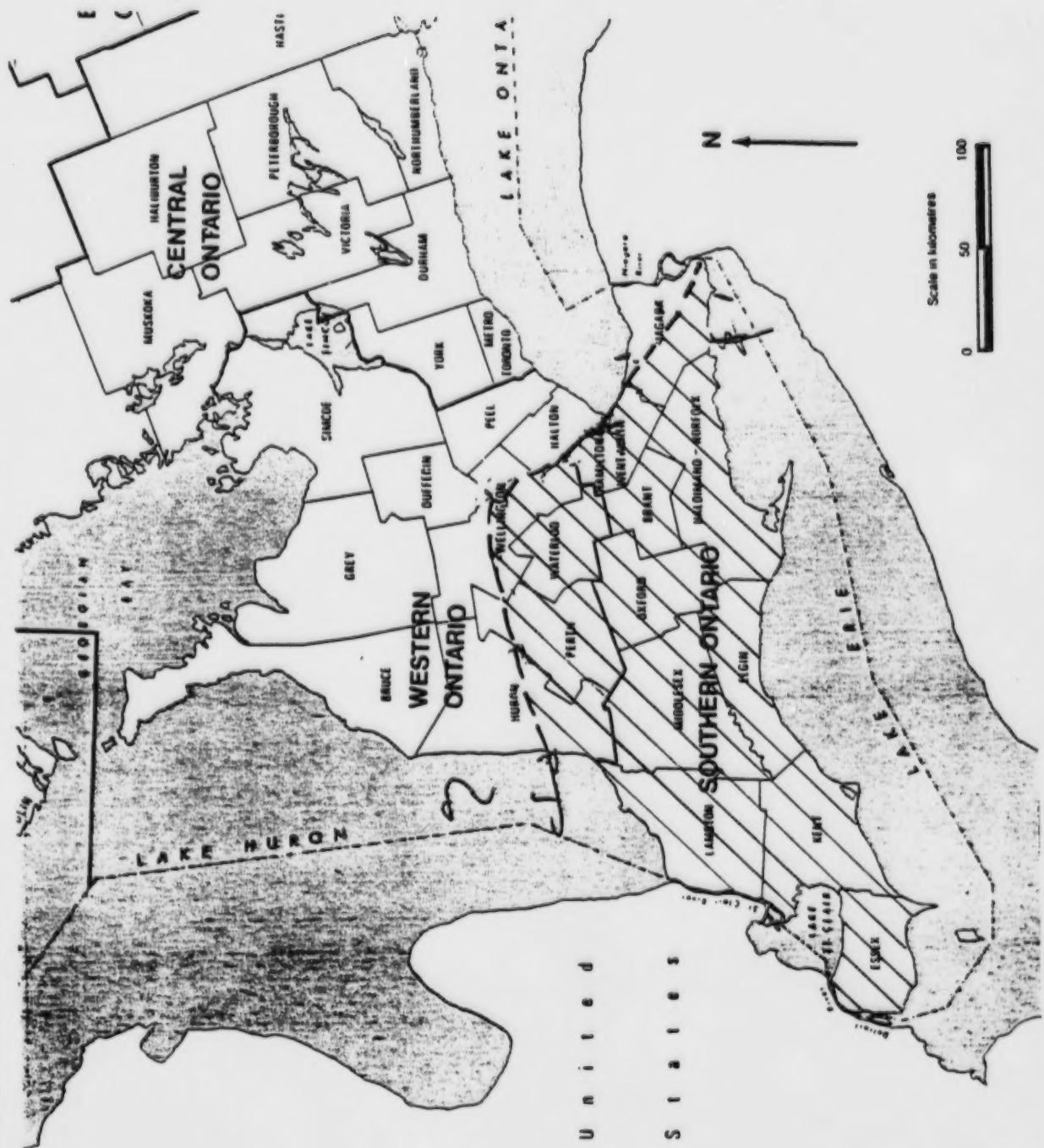
The impetus for SWEEP was the Canada-US Agreement on Great Lakes Water Quality of 1978. In October, 1983, Canada and the United States formally agreed to the Phosphorus Load Reduction Supplement to Annex III of the 1978 Agreement. The Supplement calls for measures to reduce phosphorus loadings to the lower Great Lakes. Specific targets are:

- . a reduction of 2000 tonnes per year of phosphorus loading to Lake Erie, of which Canada is responsible for 300 tonnes per year; and
- . a reduction of 430 tonnes per year of phosphorus loadings to Lake Ontario, the allocation of which has not been determined.

The requirements of the Canada-US Agreement is implemented in Canada under the Canada-Ontario Agreement Respecting Great Lakes Water Quality (COA). Under this agreement, a federal/provincial task force produced



EXHIBIT 2.1: SWEEP AREA (preliminary)





the Proposed Canadian Federal/Provincial Phosphorus Load Reduction Plan for the Great Lakes (Federal/Provincial Phosphorus Task Force, April 1985). The task force report examined the relative costs of control programs for all major sources of phosphorus (including industrial, municipal, detergent, urban runoff, agricultural runoff and livestock). The task force estimated that "cropland sources of phosphorus to Lake Erie can be reduced by 200 tonnes (approximately 10% reduction) through adoption of improved soil management and conservation practices on those farms located in priority drainage areas" (Federal/ Provincial Phosphorus Task Force, April, 1985). The plan calls for a further 100 tonne reduction from municipal, point sources in order to meet the 300 tonne Canadian target.

Soil conservation practices not only reduce phosphorus pollution from non-point agricultural sources but also prevent soil erosion and degradation. Soil erosion and degradation has generated considerable concern in the agricultural community in the last 20 years, as intensive crop production has compromised the long term productivity of the soil. Studies have estimated costs of erosion, including crop yield reduction, nutrient and pesticide loss to the southwestern Ontario agricultural industry of more than \$5.4 million annually.

SWEEP, therefore, contributes to two major government initiatives. First, it is the cornerstone of the phosphorus reduction program and of Canada's fulfillment of responsibilities under the Canada-US Agreement on Great Lakes Water Quality. Second, it is the federal government's most important contribution to the soil issue in Ontario and, at the provincial level, supports province-wide soil and water management programs (e.g., OSCEPAP, Tillage 2000).

SWEEP operates with the support and participation of five government ministries:

- . Agriculture Canada
- . Environment Canada
- . the Ontario Ministry of Agriculture and Food (OMAF)
- . the Ontario Ministry of the Environment (MOE)
- . the Ontario Ministry of Natural Resources (MNR).

Under SWEEP, the agriculture ministries take the lead in modifying farm practices and monitoring reductions in soil erosion and degradation. The environment ministries have prime responsibility for water quality monitoring activities under SWEEP and for measuring the changes in phosphorus runoff.

SWEEP works in association with the Environmental Monitoring and Modelling Committee (EMMC). The EMMC was created by the Canada/Ontario Agreement (COA) Board of Review to "ascertain the effectiveness of the point and non-point reduction measures" (Federal/Provincial Phosphorus Task Force, April, 1985). Part of the committee's mandate is to estimate changes in phosphorus runoff from changes in agricultural practices. The EMMC, therefore, collects information from and provides analysis to SWEEP. Coordination is facilitated by overlap of personnel in SWEEP and the EMMC.

### 2.3 Program Structure

SWEEP is made up of seven sub-programs. The sub-programs and their budgets are given in Exhibit 2.2. Three sub-programs fall under federal jurisdiction; three under provincial jurisdiction and one is managed jointly by both governments.

The federal sub-programs focus on "the development and evaluation phases of the actual technology that can be transferred to farmers" (News Release, May 8, 1986). The federal sub-programs are:

- . Technology Assessment Panel, Conservation Information Centre, Socioeconomic Evaluation sub-program;
- . Technology Evaluation and Development sub-program; and
- . Pilot Demonstration Watersheds sub-program.

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**EXHIBIT 2.2: BUDGET ALLOCATIONS BY SWEEP SUB-PROGRAMS (over life of program)**


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Sub-Program	Federal Contribution	Provincial Contribution
1. Technology Assessment Panel Conservation Information Centre Socioeconomic Evaluation	\$1,750,000	Nil
2. Technology Evaluation and Development	\$6,800,000	Nil
3. Pilot Demonstration Watersheds	\$5,300,000	Nil
4. Local Demonstrations	Nil	\$1,750,000
5. Technical Assistance	Nil	\$6,000,000
6. Soil Conservation Incentives	Nil	\$7,000,000
7. Administration, Monitoring, and Public Information	\$1,150,000	\$ 250,000
<b>Total</b>	<b>\$15,000,000</b>	<b>\$15,000,000</b>

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As the name suggests, the first federal sub-program is made of three separate components. Each component has its own budget and is administered separately. The managers of the Technology Assessment Panel and the Conservation Information Centre report to the Management Committee of SWEEP, while direct responsibility for the Socioeconomic Evaluation component lies with Agriculture Development Branch of Agriculture Canada.

The Technology Evaluation and Development sub-program is composed of two separate components: the on-farm evaluation and development of conservation practices (hereafter referred to as the Technology Evaluation and Development component) and Farm Level Economic Analysis. Under the second component, economic analyses are conducted for projects undertaken in both the Technology Evaluation and Development component and the Pilot Demonstration Watersheds sub-program. The Technology Evaluation and Development component is administered out of

Agriculture Canada's Harrow Research Station. The Farm Level Economic Analysis component is administered directly by the Regional Agriculture Development Branch of Agriculture Canada.

The Pilot Demonstration Watersheds sub-program, which evaluates comprehensive soil and water conservation practices on farms in selected watersheds, is administered by the Land Resources Research Centre of Agriculture Canada. In addition, the sub-program has operational links to Environment Canada and MOE's work under the EMMC.

The federal components of SWEEP are executed through private sector contractors.

Provincial sub-programs concentrate on extension work in the field and are intended to "extend technology and change farmers' attitudes and actions towards conservation cropping" (Federal/Provincial Phosphorus Task Force, April, 1985). The provincial sub-programs are:

- . Local Demonstrations sub-program;
- . Technical Assistance sub-program; and
- . Soil Conservation Incentives sub-program.

The three sub-programs are managed by the Soil and Water Management Branch of OMAF.

Federal-provincial coordination of SWEEP will be provided through a Management Committee and a Working Committee. The Management Committee consists of four members, representing Environment Canada, MOE, Agriculture Canada and OMAF. The Management Committee, which meets quarterly (or at least twice a year), is co-chaired by Agriculture Canada and OMAF. The Committee is responsible for the overall management of the program. It is responsible for providing direction and monitoring the progress of the program, for approving sub-program implementation plans, and maintaining liaison with larger federal-provincial and international water quality committees (e.g., COA Board of Review). In addition, the Management Committee oversees activities of the Conservation Information Centre and the Technology Assessment Panel.

The Working Committee of SWEEP consists of managers of all the sub-programs plus key program participants. Currently, there are fifteen members of the committee, representing Agriculture Canada, OMAF, Environment Canada, MNR, and MOE. The Committee is co-chaired by the Agricultural Development Branch of Agriculture Canada and the Soil and Water Management Branch of OMAF. It meets quarterly or as needed.

The Working Committee of SWEEP has line responsibility for implementation of the program. The Committee's main function is to coordinate and avoid duplication of activities among sub-programs. The Working Committee is the only formal mechanism by which sub-programs are tied together and the only formal forum for exchange of information among sub-program managers. The Working Committee also advises Management Committee, which entails submitting quarterly reports on sub-program activities, identifying problem areas, proposing solutions, and responding the Management Committee requests. In addition, the Working Committee reviews progress by each sub-program, approves changes in implementation plans, and oversees the Land Use Monitoring Committee.

The Land Use Monitoring Committee is also referred to as the Working Group on Measurement of Land Management and Cropping Practices. It is responsible for the survey of current farm practices. (See Appendix A for a description of the survey.) This information is intended as baseline data from which changes in cropping practices can be identified and measured. The survey is headed up by the Soil and Water Management Branch of OMAF, with participation by Environment Canada and CEIC.

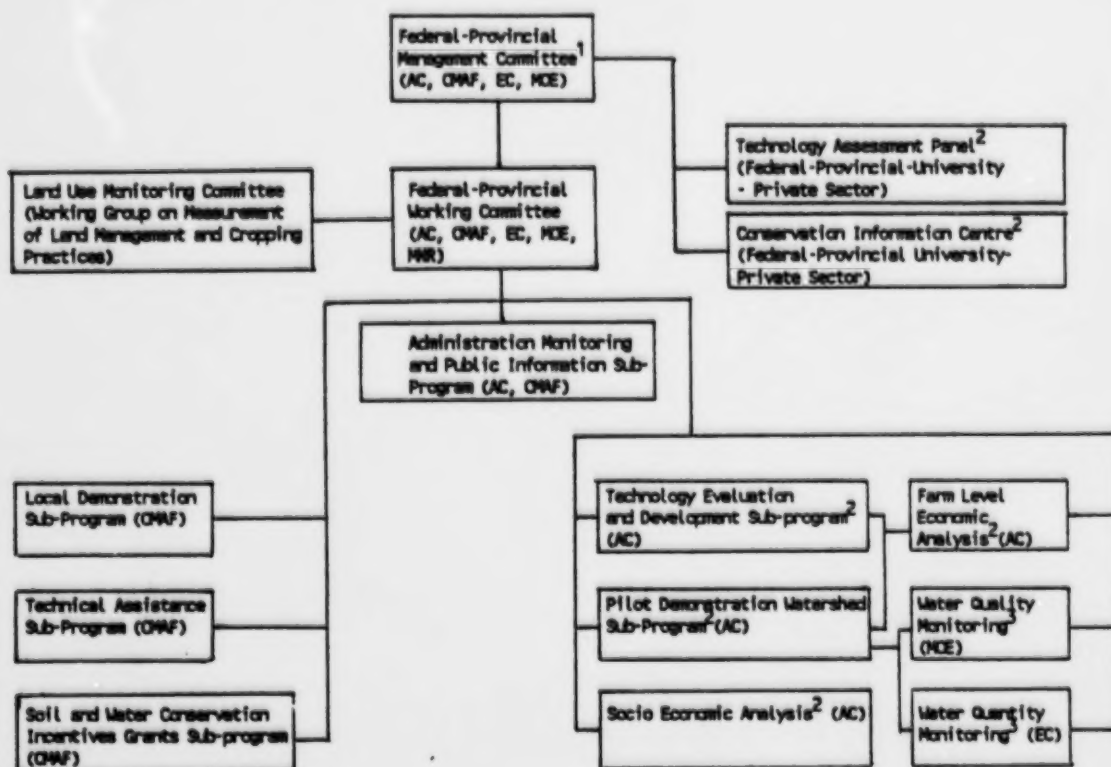
Exhibit 2.3 illustrates the structure of SWEEP.

## 2.4 Sub-Program Summaries

The following summaries are based on detailed sub-program profiles presented in Appendix C. The summaries are intended to give an overview of each sub-program's objective(s) and its main linkages to



## EXHIBIT 2.3: STRUCTURE OF SUEEP

Notes:

Agency responsible for sub-program denoted in brackets.

1. This committee interfaces with a larger federal-provincial and international committee structure.
2. Executed through private sector contractors.
3. Coordinates with CDA's Environment Monitoring and Modelling Committee

Abbreviations:

AC Agriculture Canada  
 EC Environment Canada  
 MNR Ontario Ministry of Natural Resources  
 MDE Ontario Ministry of the Environment  
 OMAF Ontario Ministry of Agriculture & Food

SWEEP's overall objectives. The detailed sub-program profiles describe activities, resources, delivery and work to date.

#### 2.4.1 Federal Programs

As noted above, the federal sub-programs focus on developing, testing, and evaluating new technologies, generating new information on soil and water conservation or facilitating access to existing information. Although individual sub-programs/components do include public information efforts, extension work and technology transfer are not the prime focus of the federal participation in SWEEP. Contribution of federal sub-programs to the overall objectives of SWEEP depends on close coordination and exchange of information with those directly involved with the program's extension and incentive services.

**Sub-program 1: Technology Assessment Panel, Conservation Information Centre, Socioeconomic Evaluation Sub-program.**

The first of the three components of this sub-program -- the Technology Assessment Panel -- is a panel of 13 to 16 soil and water specialists from the farm community, agri-business, federal and provincial governments, and universities and colleges. The purpose of the Panel is to offer advice and guidance to the Management Committee and sub-program managers by providing coordinated technical advice on research, development, and demonstration. Reporting directly to the Management Committee, the Panel contributes to SWEEP objectives by prioritizing new technologies. This exercise helps direct resources to the most promising new technologies and safeguards against expenditures on technologies unsuitable to the Ontario context. Critical reviews of sub-program technical reports ensure information is both correct and useful to the farming community.

The Conservation Information Centre is intended to ensure that an up-to-date and comprehensive information base is available to extension workers, agri-business, technical and sales representatives, leading farmers, consultants, and researchers on soil and water conservation practices and technologies. Through the Centre's activities and

clientele, information will be passed on to farmers to encourage introduction of the most appropriate conservation technologies. The Centre's specific objectives are:

- . to gather, store, and disseminate information about soil and water conservation;
- . to facilitate the exchange of information among conservation leaders; and
- . to focus public attention on the need to control rural and urban non-point sources of pollution resulting from land degrading management practices.

The Centre will not store large volumes of literature nor information that is readily available elsewhere. However, it will be responsible for maintaining a library of all reports and materials generated under SWEEP. Agriculture Canada will provide funding for the first two years of the Centre's operation, with declining funding in the following three years. In the sixth year, the continued operation of the Centre will depend on its ability to support itself.

The objectives of the Socioeconomic Evaluations component is to assist in the development of graduate student expertise and interest in the social and economic aspects of agricultural soil and water quality issues and to research the social and economic conditions and impacts of incentive policies and programs. The Socioeconomic Evaluation component furthers the general objectives of SWEEP by contributing to a base of knowledge on soil and water management issues and the technology transfer process. This information can then be used by extension workers or in developing policies and programs to encourage adoption of conservation practices.

#### **Subprogram 2: Technology Evaluation and Development**

This sub-program officially consists of two components. The two components are carried out by different contractors and are administered by different groups within Agriculture Canada.



The larger component -- hereafter referred to as the Technology Evaluation and Development component -- tests new conservation technologies under commercial farm conditions and evaluates these technologies for their impacts on soil erosion, water quality and agronomics. The component is expected to bring new ideas to the region and to demonstrate their effectiveness through the evaluation process. Results of the demonstrations will be made available to the Conservation Information Centre and to extension workers so that the information can be disseminated to individual farmers. The Technology Evaluation and Development component will also contribute to a stock of technologies suitable for adoption through the remainder of the 1990s.

The second part of this sub-program is the Farm Level Economic Analysis component. This component is an integral part of the evaluation process for technologies examined under both the Technology Evaluation and Development component and the Pilot Demonstration Watersheds sub-program. The overall objective of the economic analyses is to determine the economic impact of each conservation technology or technology system on:

- . the farm firm;
- . the watershed farmers collectively;
- . the watershed authority; and
- . the local municipality (Agriculture Canada, Implementation Plan Record, Farm Level Economics Component, October, 1986).

In addition, the evaluations will determine the economic effectiveness of each technology or technology system in terms of reduction of phosphorus runoff and soil degradation. The economic evaluations are linked to SWEEP objectives by identifying profitable technologies which are immediately attractive to farmers and by identifying those technologies which are very effective at reducing phosphorus runoff or soil erosion but would require subsidies to encourage their adoption.

### **Sub-program 3: Pilot Demonstration Watersheds**

The Pilot Demonstration Watersheds sub-program is intended to evaluate and demonstrate the effectiveness of implementing comprehensive soil and water conservation practices on all farms in a few selected watersheds. The program will involve a minimum of three paired watersheds. In one of each pair, farms will use selected conservation technologies or technology systems. In the other, "control" watersheds, farms will continue using current practices. The demonstrations will focus on known technologies or technology systems. The purpose of the demonstrations is to evaluate the practicality of technologies (in terms of soil management, agronomics, economics) and to measure phosphorus reduction which is possible using known conservation practices.

The Pilot Demonstration Watersheds sub-program is linked to SWEEP objectives in several ways. First, implementation of conservation technologies are designed to directly reduce phosphorus runoff and soil erosion in the demonstration watersheds. Secondly, the demonstrations may encourage other farmers to adopt similar practices. As with each of the other federal sub-programs, the Pilot Demonstration Watersheds program will contribute to the information base to support extension efforts and, ultimately, adoption of conservation technologies. Finally, the data generated in the Pilot Demonstration Watersheds will assist in estimating total reductions in phosphorus loadings to the Lake Erie basin.

#### **2.4.2 Provincial sub-programs**

All three provincial sub-programs are administered and implemented by the Soil and Water Management Branch of OMAF. The three sub-programs share technical expertise and field staff. As indicated in the detailed profiles in Appendix C, each sub-program includes direct contact with the farmers. The three sub-programs are the main vehicle through which farmers will be encouraged to adopt conservation practices, thereby contributing directly to SWEEP objectives. The three provincial sub-programs can, therefore, be viewed as a technology

transfer package. It is expected that the sub-programs will make use of the information generated under the federal sub-programs and will transfer that information to the farm level.

#### **Sub-program 4: Local Demonstrations**

Two separate types of demonstration projects will be carried out under the Local Demonstrations sub-program: 30 Tillage-2000 (a province-wide demonstration program) sites and 80 side-by-side plot demonstrations. The purpose of both projects is to demonstrate state of the art conservation tillage practices to farmers, where "demonstration" encompasses dissemination of information about practices and their (agronomic, soil quality and economic) effects. In addition, local demonstrations will contribute to the stock of knowledge on conservation practices. In particular, the opportunity exists for the EMMC to use data collected on the T-2000 plots in estimating actual reductions in phosphorus loadings to the Lake Erie basin.

#### **Sub-program 5: Technical Assistance**

The objectives of the Technical Assistance sub-program are:

- . to provide farmers with conservation advice so they understand soil degradation and erosion problems; and
- . to assist farmers to seek and implement remedial soil management programs.

The Technical Assistance sub-program focuses directly on technology transfer by providing hands-on advice and assistance to farmers, preparing and publishing fact sheets and articles, organizing farm meetings, tours, and workshops, and providing technical assistance to the other provincial sub-programs.

#### **Sub-program 6: Soil Conservation Incentives**

The Soil Conservation Incentives sub-program provides grants to assist in the capital cost of constructing devices on farms and within ditches to reduce soil erosion and to protect water quality. The value of

grants is 66 2/3% of eligible costs to a maximum of \$10,000. As part of the grant process, sub-program personnel assist in assessing, designing, and planning the structures and devices. In addition, courses for agri-business (e.g., drainage contractors) will be organized under this sub-program.

#### 2.4.3 Joint Federal-Provincial Sub-Programs

##### Sub-program 7: Administration, Monitoring and Public Information

The administration and monitoring component of this sub-program will support day-to-day management and overall program coordination. This work will be administered jointly by OMAF and Agriculture Canada and will employ a full time development officer and secretary. The administration component will monitor the progress of all sub-programs, prepare quarterly progress reports for review by the Working Committee and Management Committee and will monitor expenditures against budgets. The implementation officer is responsible for day-to-day coordination of the program and its components and for production of management reports for the Management and Working Committees.

The Public Information component of this sub-program is intended to "help to generate the positive public and farm environment that will encourage early and active involvement in the program and sustained interest in the program over its five year life" (Agriculture Canada, Implementation Plan Record, December, 1986). It will inform producers, the agricultural industry and the general public of SWEEP and its goals. It will initiate public information and program promotion activities to ensure that sub-programs are clearly identified and understood, and that activities and results are publicized. A federal public information contractor will carry out his tasks in association with OMAF's Information Division. The Public Information component is overseen by a Communications Committee.

## 2.5 SWEEP Logic Model

The logic model in Exhibit 2.4 illustrates the resources, activities, outputs, and intermediate and ultimate objectives of SWEEP.

As indicated in the logic model, each of the activities produce management reports, technical information or involve contact with farmers. These outputs and activities are plausibly linked to the attainment of the intermediate objectives and the two ultimate objectives of SWEEP.

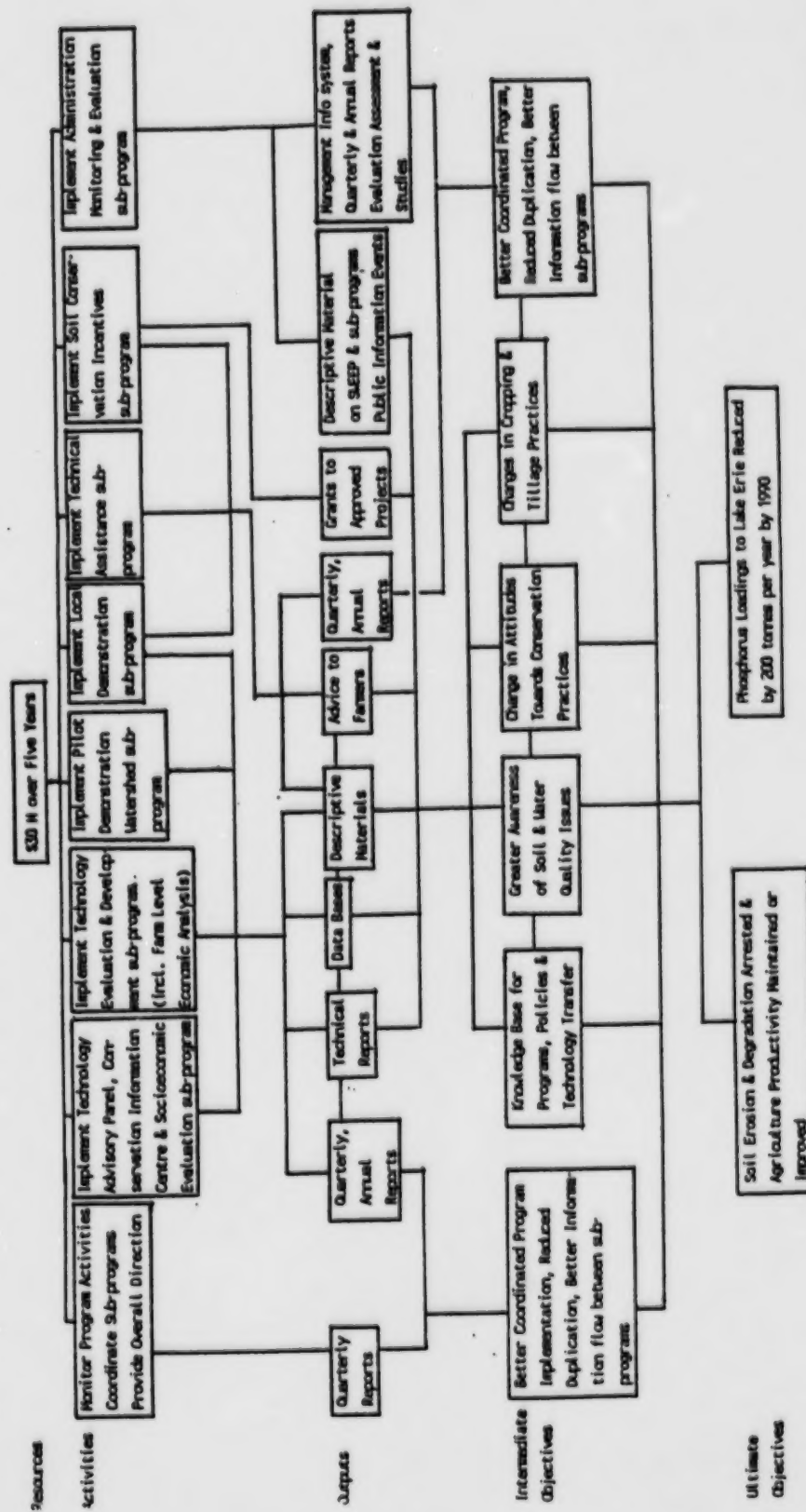
## 2.6 Work To Date

As of March, 1987, all provincial sub-programs were operational. On the federal side, contracts had been signed with management contractors for the Technology Evaluation and Development, Farm Level Economic Analysis and Technology Assessment Panel components. The Socioeconomic Evaluations component was also operational. The management contract for the Pilot Demonstration Watersheds sub-program was awaiting approval by Treasury Board. A feasibility study had been completed and a charter for incorporation had been drafted for the Conservation Information Centre. Several activities under the Public Information component had been initiated. Further details on work to date for each program component included in the sub-program profiles (Appendix C).

Exhibit 2.5 presents expenditures for each program component for the first two years of the program (FY 1985/86 and FY 1986/87). Total expenditures over the past two years has amounted to \$5.86 million (federal: \$1.12 million; provincial: \$4.74 million). This totals 20% of the \$30 million program fund. Delays in the start-up of the federal components and slow take-up of the Soil Conservation Incentives sub-program account for the low spending levels.



EXHIBIT 2.4: LOGIC MODEL -- SWEEP



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**EXHIBIT 2.5: SWEEP EXPENDITURES -- APRIL 1, 1985 TO MARCH 31, 1987**  
**(\$000S)**

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Sub-Program	Apr 1/85 - Mar 31/86			Apr 1/86 - Mar 31/87 (estimated)		
	Fed.	Prov.	Total	Fed.	Prov.	Total
1. Technology Assessment Panel, Conservation Information Centre, Socio-Economic Evaluation	14.9	-	14.9	111.0	-	111.0
2. Technology Evaluation and Development						
a) Harrow						
b) Agriculture Development	352.6	-	352.6	157.0 68.0	-	157.0 68.0
3. Pilot Demonstration Watersheds						
a) LRRC	215.9	-	215.9	16.7	-	16.7
b) Env. Can.	31.2 <sup>a</sup>	-	31.2 <sup>a</sup>	0.0 <sup>a</sup>	-	0.0 <sup>a</sup>
c) MOE	-	80.0 <sup>a</sup>	80.0 <sup>a</sup>	-	23.0 <sup>a</sup>	23.0 <sup>a</sup>
4. Local Demonstrations	-	453.0	453.0	-	358.6	358.6
5. Technical Assistance	-	1113.0	1113.0	-	1190.0	1190.0
6. Soil Conservation Incentives	-	624.0	624.0	-	946.0	946.0
7. Administration, Monitoring and Public Information	52.4	0.0	52.4	124.0	60.0	184.0
<b>TOTAL</b>	<b>635.8</b>	<b>2190.0</b>	<b>2825.8</b>	<b>476.7</b>	<b>2554.6</b>	<b>3031.3</b>

Abbreviations: LRRC: Land Resource Research Centre  
 Env. Can.: Environment Canada  
 MOE: Ontario Ministry of the Environment

Notes: <sup>a</sup> Not part of agreement funding and not included in total expenditures.

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## 3.0 EVALUATION ISSUES

In this section, we list evaluation issues during the review of documentation and interviews. Evaluation issues are presented according to the *right side then alternate* of program evaluation issues specified by the Office of the Comptroller General (Treasury Board of Canada, 1981):

Program Rationale: Does the program make sense?  
 Objectives Achievement: Has the program performed as expected?  
 Other Impact and Effects: What has happened as a result of the program?

Program Design, Delivery and Alternatives: Are there better ways of achieving the results?

Each issue was assigned a priority according to its importance in the evaluation of the program. The priorities were defined as follows:

High: It is very important that high priority issues be investigated during the evaluation. The issue is directly related to key program objectives, major unintended effects or significant restructuring of the program.

Medium: An analysis of medium priority issues provides important information on the operation of the program.

Low: Analysis of low priority issues provides background information on the operation of the program and some insight into modifications that may be required or desirable.

Following the statement of each issue, its priority is noted and explained.

## 3.1 Issues Related to Program Rationale

1. Issue: Is there a need to reduce phosphorus runoff to Lake Erie?

Priority: Low

Discussion: Phosphorus loadings to the Lake Erie basin are cited in both the Canada-Ontario and Canada-U.S. Agreements on Great Lakes Water Quality. Background papers and studies to the agreements document the



problems associated with and the need to reduce phosphorus loadings. In the opinion of SWEEP personnel, further analysis is not necessary to validate this component of program rationale. This issue, therefore, has been given a low priority.

2. Issue: Is a target of 200 tonnes per year by 1990 achievable?

Priority: Medium/High

Discussion: The target of 200 tonnes per year is documented in the Phosphorus Load Reduction Plan (Federal/Provincial Phosphorus Task Force, April, 1985). The target is based on reducing phosphorus runoff by 0.5 kg./ha per year on 400,000 ha. of farmland. However, this target has not been supported by empirical evidence on the capabilities of currently available technologies. The SWEEP program, through the Pilot Demonstration Watersheds sub-program, will generate the data to support or revise the target. Assessment of the 200 tonnes per year target should, therefore, be included as an important issue in the evaluation study.

Discussion with program personnel familiar with studies and documentation for the Canada-Ontario and Canada-U.S. Agreements suggested that the target date of 1990 is not noted in the documentation. The reasonableness of the target date, therefore, should be evaluated.

3. Issue: Are changes in agricultural practices the best approach to decreasing non-point phosphorus runoff?

Priority: Low

Discussion: Other sources of non-point phosphorus and methods for reducing those sources are examined in the Phosphorus Load Reduction Plan. The appropriateness of focussing on changes in agricultural practices is, therefore, established. Furthermore, the relevance of modifying agricultural practices is not expected to change over the course of the program. This evaluation issue is, therefore, assigned a low priority.

4. Issue: Is there a need to reduce soil erosion and degradation?

Priority: Low

Discussion: Studies on soil erosion and degradation and its current and potential impact on agricultural productivity date back to at least the early 1970s. Major reports include the PLUARG studies and Senator Sparrow's report. The need to reduce soil erosion and degradation is considered a "motherhood" issue by program personnel and is given a low priority.

### 3.2 Issues Related to Objectives Achievement

5. Issue: Has phosphorus runoff been reduced by 200 tonnes per year by 1990?

Priority: High

Discussion: This issue deals with one of the stated program objectives.

6. Issue: What has been the impact of SWEEP on agricultural productivity with respect to agronomics (including yields, soil quality, erosion and degradation)?

7. Issue: What has been the impact of SWEEP on agricultural productivity in terms of farm income?

Priority: High (for both issues #6 and #7)

Discussion: These issues deal with stated objectives of the program.

8. Issue: Has the program produced a useful and reliable information base on which the introduction of conservation practices and government policies and programs may be based (even after the scheduled termination of SWEEP)?

9. Issue: Has awareness of soil and water quality issues changed?

10. Issue: Has the conservation ethic been promoted? Have attitudes towards conservation practices become more favourable?

Priority: Medium/High (for issues #8, #9 and #10)

Discussion: Although not stated objectives of the program, these three issues reflect intermediate goals of SWEEP. Achievement of these intermediate goals are important to the program's success.

11. Issue: To what extent can changes in (i) awareness of soil and water quality issues and (ii) attitudes towards conservation practices, be

attributed to SWEEP? To what extent can changes in land management practices be attributed to SWEEP?

Priority: High

Discussion: Analysis of this issue tries to isolate the effects of the program from external factors. It is, therefore, important input to the assessment of objectives achievement.

### 3.3 Issues Related to Other Program Impacts

12. Issue: Has the program stimulated further research or developed expertise in soil and water conservation?

Priority: Medium

Discussion: Program personnel indicated that soil and water conservation expertise does not currently exist in Ontario and that an important spinoff of the program is development of this expertise.

13. Issue: Has the the program contributed to our understanding of the technology transfer process?

Priority: Low

Discussion: This program impact was considered important only in so far as the objectives of the Socioeconomic Evaluations component are achieved, an issue which is subsumed under evaluation issue 8. Further study of this issue is not considered important.

14. Issue: Has the program enhanced cooperation between implementing agencies?

Priority: Low

Discussion: Analysis of this evaluation issue would provide useful background information of the program, but is given a low priority for two reasons. First, enhancing cooperation was not considered an objective of SWEEP. Second, cooperation will be at least partially addressed in issues relating to sub-program coordination in issue 20.

15. Issue: Have agri-business and other support industries been involved?

Priority: Medium

Discussion: Program personnel indicated that promotion and implementation of conservation practices will be enhanced by support from agri-business and other ancillary industries. The success of the

program, therefore, will partly depend on the degree to which it has stimulated their involvement.

16. Issue: Has the introduction of conservation practices raised new farm management or environmental issues?

Priority: Medium

Discussion: Several program personnel raised the concern that conservation practices could introduce new farm management or environmental problems. Identification of these impacts would provide good background information on factors contributing to or compromising achievement of program objectives.

17. Issue: Have there been any other unintended impacts?

Priority: Medium

Discussion: This evaluation issue attempts to capture any other positive or negative unintended impacts of the program. It places evaluation of the program in a broader context and highlights advantages and disadvantages of pursuing the program's objectives.

#### 3.4 Issues Related to Program Design, Delivery, and Alternatives

18. Issue: Does the program complement/overlap/duplicate existing efforts in soil and water conservation?

Priority: Medium

Discussion: Few program personnel perceived overlaps or duplication as a problem for SWEET, noting that most agencies involved in soil and water conservation are part of the program. However, as interest in this area grows and new agencies or organizations become involved, complementarity/overlap/duplications may develop. This issue is given a medium priority because it may suggest modifications to SWEET's structure to ensure a comprehensive and integrated approach to soil and water conservation.

19. Issue: Is the organizational structure of SWEEP appropriate to the delivery of the program?

Priority: Medium/High

Discussion: The appropriateness of the organizational structure was raised by several program personnel. Some people noted that the structure incorporates relatively new or unique features; others mentioned concerns with the coordination of sub-program activities and responsibilities. Specific issues raised were the vulnerability of SWEEP activities to policy decisions in other areas of the participating agencies; the appropriateness of implementing sub-programs by contracting to private consultants; and the complexity of the organizational structure.

20. Issue: Are available resources commensurate with activities and objectives under each of the sub-programs/components?

Priority: Medium/High

Discussion: The issue of resources is assigned a medium/high priority because it sheds light on both the relative success of sub-programs in meeting their objectives and on helpful reallocations of budgets.

21. Issue: Is a five-year period long enough to achieve program (and sub-program) objectives?

Priority: Medium

Discussion: This issue is closely linked with evaluation issues 2 and 8. Although the program itself may exist for more than five years (i.e., with reprofiling of the federal component), individual sub-programs and demonstrations and field tests are not scheduled to last more than four or five years. Concerns were expressed that insufficient data will have been collected or the effects of conservation practices may not be measurable within that time frame.

22. Issue: Are there more cost-effective programs that would achieve the same objectives and impacts?

Priority: High

Discussion: OCG Guidelines (Treasury Board of Canada, 1981) require that this issue be addressed. Identification of more cost-effective program designs is particularly applicable to SWEEP because (i) it is a new, major initiative (ii) it incorporates relatively new program

design elements and (iii) it focusses on issues of increasing public concern and action.



#### 4.0 ANALYSIS OF EVALUATION ISSUES

The purpose of this section is to define how evaluation issues may be addressed. The section is divided into two parts. Research questions, data items, and data sources are identified for each evaluation issue in Section 4.1. Information sources are discussed in more detail in Section 4.2.

#### 4.1 Research Questions, Data Items and Information Sources

Exhibit 4.1 documents how each evaluation issue will be analyzed in terms of research questions, data items, and information sources. In some cases, data sources have been specified to the appropriate program component. Analyses have been identified for each evaluation issue, regardless of its priority. This approach indicates the extra effort required to answer lower priority issues and provides a complete basis on which to develop evaluation options.

In the rest of this section, the analysis for key issues are reviewed.

##### Evaluation Issue 2

To assess whether a target of 200t/yr by 1990 is achievable, empirical evidence on the capabilities of known conservation technologies and practices is needed. We have suggested two yardsticks by which the achievability of 200t/yr may be assessed:

- . Reductions in phosphorus runoff which can be achieved by implementing "best available conservation technology" throughout the SWEEP area (research question 2A in Exhibit 4.1); and
- . Reductions in phosphorus runoff which can be achieved by implementing new technologies throughout the SWEEP area (research question 2B in Exhibit 4.1).

The capability of best available technologies (BAT) to reduce phosphorus runoff can be estimated from data from the Pilot Demonstration Watershed projects. These data, which are documented in

## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
<b>A. PROGRAM RATIONALE</b>				
1. Is there a need to reduce phosphorus runoff to Lake Erie?	L	A. What effects do high phosphorus loadings have?  B. What are the benefits of reducing phosphorus loadings?	i) Description of biophysical and socioeconomic effects  ii) Qualitative description of effects of reducing loadings with respect to water supplies, recreation, fisheries, agriculture, etc.	• Agreement documentation  • Agreement documentation (e.g., Phosphorus Load Reduction Plan)
2. Is a target of 200 t/yr by 1990 achievable?	M/N	A. Can phosphorus runoff be reduced by 200 t/yr by implementing "best available conservation technology"?	i) Per hectare reduction in phosphorus runoff in pilot demonstration watershed plots. ii) Total potential reduction in phosphorus in SUEEP area.	• Sub-program data & technical reports (PMU) • Data item 2A(1) • ENMC model
		B. If no, can 200 t/yr be achieved using new technologies?	i) Per hectare reduction in phosphorus runoff in test plots of new technologies. ii) Extrapolated estimate of runoff for SUEEP area.	• Sub-program data and technical reports (TED) • Data item 2B(1) • ENMC model
		C. What is the basis for a 1990 target date?	i) Background & rationale for 1990 date	• Agreement Documentation
		D. If 200 t/yr is technically achievable, can it be done by 1990?	i) Number of farms which must adopt best available or new conservation technology to meet target.  ii) Opinions on rates of adoption of (a) best available technology and (b) new technology.	• Findings from research questions 2A & B (# hectares) • OMAF agricultural stats (avg. farm size)  • Independent experts

## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
3. Are changes in agricultural practices the best approach to decreasing non-point phosphorus runoff?	L	A. Is agricultural runoff a large proportion of runoff?  B. Is reducing agricultural runoff the most cost-effective method of reducing non-point runoff?	i) Estimates of runoff from each non-point source.  i) Relative cost of reducing phosphorus (per tonne) for each non-point source.  i) Increased rates of soil erosion ii) Nutrient losses.	Agreement documentation Agreement documentation (e.g. Phosphorus Load Reduction Plan)
4. Is there a need to reduce soil erosion and degradation?	L	A. Has soil quality deteriorated?	i) Changes in yield ii) Changes in farm costs (e.g. pesticide losses) iii) Changes in farm net income due to soil degradation	Agreement documentation (e.g. PLUANG, Senator Sparrow studies, Wall & Driver, 1982) As above
5. Has phosphorus runoff been reduced by 200 t/yr by 1990?	H	A. To what extent have conservation practices been adopted?  B. How have changes in land management practices affected phosphorus runoff from the SUEEP area?	i) Number of hectares by technology ii) Number of farms iii) Number & list of technologies  i) Change in phosphorus runoff per hectare for each technology ii) Change in runoff from SUEEP area.	Inventory of land management practices (1986; 1993) As above As above Sub-program data & technical reports (PMU; IED; 1-2000) EMHC-sponsored field tests Data items 5A(a) & 5B(i) EMHC model

## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
6. What has been the impact on agricultural productivity with respect to agronomics (yields, soil quality, erosion, and degradation)?	H	C. Are actual reductions a reasonable proportion of potential reductions?	i) Actual change in phosphorus runoff as a percent of potential change associated with best available technology.	. Data items 58(i) & 2A(ii)
		D. What reduction in phosphorus runoff can be attributed to SUEEP?	i) Percent of hectares changed to conservation practices because of SUEEP (by technology). ii) Change in phosphorus runoff in SUEEP area attributable to SUEEP	. Findings from research question 11C . Data item 50(i) . ENMC model or data item 58(ii)
6. What has been the impact on agricultural productivity with respect to agronomics (yields, soil quality, erosion, and degradation)?	H	A. Have conservation practices reduced soil runoff and if so, how?	i) Change in soil runoff per hectare by technology from test plots ii) Number of hectares converted to conservation practices by technology (same as data item 5A(i)) iii) Change in soil runoff in SUEEP area.	. Sub-program data & technical reports (POW; TED; T-2000) . ENMC-sponsored field tests . Inventory of land management practices (1986; 1993) . Data items 6A(i) & (ii) . ENMC model
		B. Have conservation practices affected soil quality and if so, how?	i) Change in soil quality (chemical, fertilizer, organic matter content) per hectare by technology from test plots ii) Number of hectares converted to conservation practices by technology (same as data item 5A(i)) iii) Change in soil quality in SUEEP area.	. Sub-program data & technical reports (POW; TED; T-2000) . ENMC-sponsored field tests . Inventory of land management practices (1986; 1993) . Data items 6B(i) & (ii) . ENMC model

## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
7. What has been the impact of conservation techniques on agricultural productivity in terms of farm income?	H	C. Have conservation practices improved agricultural yields and if so, by how much?	i) Percent change in yield per hectare by technology and crop type from test plots. ii) Number of hectares converted to conservation practices by technology (same as data item 5A(i))	. Sub-program data & technical reports (POM; TED; T-2000) . EMMC-sponsored field tests . Inventory of land management practices (1986; 1993)
		D. Are there delayed agronomic impacts of conservation practices which are not captured in current measurements; if so, how significant are they likely to be?	i) Opinions on degree to which current measurements capture impacts of conservation measures	. Independent experts (agronomy, soil quality)
		E. What changes in agronomics can be attributed to SUEEP?	i) Percent of hectares converted to conservation practices because of SUEEP (same as data item 5p(i)) ii) Changes in agronomic indicators attributable to SUEEP.	. Findings from research question 11C . Data item 6E(i) . Data items 6A(iii), 6B(iii) and 6C(iii) or EMMC Model
		A. Have conservation practices resulted in increased revenue and/or costs?	i) Capital and/or start-up cost of conservation practices by technology ii) Change in operating costs, gross revenues & net income per hectare by technology iii) Number of hectares converted to conservation practices by technology (same as data item 5A(i)) iv) Change in economic indicators in SUEEP area.	. Sub-program data & technical records (FLEA; LD) . Sub-program data & technical records (FLEA; LD) . Inventory of land management practices (1986; 1993) . Data items 7A(i), (ii) & (iii) . EMMC model

## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
B. What changes in economic productivity are attributable to SUEEP?	N/A	A. What information has been documented?	i) Percent of hectares converted to conservation practices because of SUEEP (same as data item 50(i))	Inventory of land management practices (1986; 1993)
			ii) Changes in economic indicators attributable to SUEEP.	Data items 7A(iv)
B. Has the program produced a useful and reliable information base?	N/A	A. What information has been documented?	i) Number of technologies tested and evaluated from TED; FLEA, POM & LD sub-programs/components	Sub-program records (TED; FLEA; POM; LD)
			ii) Number of research projects funded under SEE component.	Sub-program records (SEE)
B. Is information comprehensive and reliable? Can it support generalized recommendations?	N/A	A. What information has been documented?	i) Opinions on comprehensiveness of TED, FLEA, POM & T-2000 evaluations	Independent experts (soil & water quality; economic analysis) Implementation on staff (TAP)
			ii) Opinions on reliability of T-2000, TED, FLEA & POM evaluations (incl. data reliability, representativeness of test sites).	Independent experts (soil & water quality; economic analysis) Implementation staff (TED; FLEA; POM; T-2000)
C. Is information readily available?	N/A	A. What information has been documented?	i) Adequacy of CIC services & resources (incl. number of visits/enquiries, list of contacts, catalogue of SUEEP; reports; opinions).	Sub-program records (CIC) Implementation staff (esp. TA; LD; SCI; TAP) Survey of target groups
			ii) Timeliness & availability of information from other program components	Implementation staff (esp. TA; LD; SCI; TAP)
C. Availability of conservation information.	N/A	A. What information has been documented?	iii) Availability of conservation information.	Survey of farmers (1993) Survey of target groups



## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
D. To what extent has the information base contributed to adoption of conservation practices or attitudes towards these practices?			i) Percent aware of TED, FLEA, POW, & T-2000 evaluations & of SEE research	Implementation staff (LD; TA; SCI)
			ii) Importance of TED; FLEA; POW; & T-2000 evaluations in recommendations to farmers/agribusiness	Implementation staff (LD; TA; SCI)
			iii) Relevance of SEE topics to SUEEP objectives	Review of projects by evaluation team
			iv) Importance of SEE research in delivering extension services	Implementation staff (LD; SCI; TA)
			v) Opinions on importance of SEE research results in developing conservation programs & policies	Management Committee Implementation Staff (MC)
			vi) Number of farm management decisions based on TED, FLEA, POW, & T-2000 evaluations	Findings from evaluation issue 11C
E. To what extent will the information base support & encourage future adoption of conservation practices or attitudes towards those practices?			i) Opinions on this question	Implementation staff (esp. LD; TA; SCI; TAP)
F. Has awareness of soil and water quality issues changed?	N/A	A. Has awareness of (a) soil quality & (b) water quality issues increased?	i) Percent of farmers aware of soil & water quality issues	Survey of farmers
			ii) Percent of members of agribusiness & other target groups aware of soil & water quality issues	Survey of target groups
			iii) Opinions on changes in ability of farmers/agribusinesses to diagnose soil problems	Survey of farmers (1993) Survey of target groups Implementation staff (LD; SCI; TAP)

## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
			(iv) Opinions on this question	<ul style="list-style-type: none"> <li>Survey of farmers</li> <li>Survey of target groups</li> <li>Implementation staff (LC; TA; SCI; TAP)</li> </ul>
		B. Has the perceived importance of soil and water quality issues changed?	i) Percent of farmers ranking & water quality issues as important or very important ..... ii) Percent of members of target groups whose ranking of importance of soil & water quality issues has changed ..... iii) Opinions on this question ..... iv) Amount of funding from fee for service or memberships to CIC	<ul style="list-style-type: none"> <li>Survey of farmers</li> <li>Survey of target groups</li> <li>Implementation staff (LD; TA; SCI; TAP)</li> </ul>
10. Has the conservation ethic been promoted? Have attitudes towards conservation practices become more favourable?	M/H	A. Is there greater acceptance of conservation practices?	i) Catalogue & severity of barriers to adoption ..... ii) Analysis of changes in attitudes in demonstration watersheds ..... iii) Opinions on this question ..... iv) Amount of funding from fee for service or memberships to CIC	<ul style="list-style-type: none"> <li>Survey of farmers</li> <li>Sub-program data &amp; technical reports (POU)</li> <li>Survey of farmers</li> <li>Survey of target groups</li> <li>Implementation staff (LD; TA; SCI; TAP)</li> </ul>
		B. Are farmers more knowledgeable about conservation practices?	i) Percent of farmers familiar with conservation practices ..... ii) Percent of farmers who consider conservation practices in farm management decisions .....	<ul style="list-style-type: none"> <li>Survey of farmers</li> <li>Survey of farmers</li> </ul>

## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
11. To what extent can changes in (i) awareness of soil & water quality issues and (ii) attitudes towards conservation practices be attributed to SUEEP? To what extent can changes in land management practices be attributed to SUEEP?	H	A. Is the public aware of SUEEP?	<p>(iii) Opinions on this question</p> <p>i) Catalogue of promotional materials (e.g., number of brochures, media articles, exhibits, fact sheets, meetings, farm tours)</p> <p>ii) Number of farm visits &amp; farmers assisted</p> <p>iii) Number of grants awarded</p> <p>iv) Number of T-2000, side-by-side &amp; OSCIA demonstrations</p> <p>v) Percent of farmers/numbers of target groups aware of SUEEP &amp; each SUEEP sub-program/component</p>	<p>• Survey of farmers</p> <p>• Survey of target groups</p> <p>• Implementation staff (TA; LD; SCI; YAP)</p> <p>• Sub-program records (LD; TA; PI)</p> <p>• Sub-program records (TA)</p> <p>• Sub-program records (SCI)</p> <p>• Sub-program records (LD)</p> <p>• Survey of farmers (1993)</p> <p>• Survey of target groups</p>
B. To what extent would awareness of soil and water quality issues and attitudes towards conservation practices have changed in the absence of SUEEP?			<p>i) Sources of information that have affected awareness or attitudes (by sub-program)</p>	<p>• Survey of farmers (1993)</p> <p>• Survey of target groups</p>
			<p>ii) Relative importance of SUEEP information/activities</p>	<p>• As above</p>
C. To what extent would conservation practices have been adopted in the absence of SUEEP?			<p>i) Percent of farmers receiving assistance/information from SUEEP (specified by sub-program/component)</p> <p>ii) Importance of assistance in conservation decisions</p>	<p>• Survey of farmers (1993)</p> <p>• As above</p>

## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
			<ul style="list-style-type: none"> <li>(iii) Percent of farmers who would not have implemented conservation practices in absence of SUEEP</li> <li>(iv) Changes in or development of new products based on SUEEP activities</li> </ul>	<ul style="list-style-type: none"> <li>• As above</li> <li>• Survey of target groups (agribusiness)</li> </ul>
12. Has the program stimulated further research or developed expertise in soil and water conservation?	H	A. To what extent has research activity increased?	<ul style="list-style-type: none"> <li>i) Number and nature of new university research projects</li> <li>ii) Examples of development of new products or practices by agri-business</li> <li>iii) Number and nature of new government research projects</li> <li>iv) Number of requests for background research &amp; trend over program life</li> </ul>	<ul style="list-style-type: none"> <li>• Survey of target groups (research community)</li> <li>• Survey of target groups</li> <li>• Implementation staff (LD; TA; SCI; YAP)</li> <li>• Implementation staff (UC)</li> <li>• Sub-program records (CIC)</li> </ul>
		B. To what extent has private sector capability in soil & water conservation issues changed?	<ul style="list-style-type: none"> <li>i) Opinions on this question</li> </ul>	<ul style="list-style-type: none"> <li>• Survey of target groups</li> <li>• Implementation staff (UC)</li> <li>• Management Committee</li> </ul>
13. Has the program contributed to our understanding of the technology transfer process?	L	A. Is there new & useful information on the technology transfer process?	<ul style="list-style-type: none"> <li>i) Number of projects funded under SEE specifically addressing technology transfer issues</li> <li>ii) Opinions on usefulness of SEE research (examples of results being incorporated into conservation programs, policies, &amp; extension services)</li> <li>iii) Opinions on usefulness of attitudinal data from PDW</li> </ul>	<ul style="list-style-type: none"> <li>• Sub-program records (SEE)</li> <li>• Management Committee</li> <li>• Implementation staff (LD; TA; SCI; UC)</li> <li>• Review of data &amp; analyses by evaluation team</li> </ul>

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Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
14. Has the program enhanced cooperation between implementing agencies? process?	L	A. Has there been close communication between and coordination of sub-program components?  B. Have any new cooperative efforts been initiated?	(iv) Lessons learned from technology transfer activities under SUEEP  i) Extent to which sub-program personnel are aware of other activities under SUEEP ..... ii) Opinions on this question .....  i) Number & nature of new initiatives ..... ii) Opinions on role of SUEEP in stimulating these initiatives .....	- Implementation staff  - Implementation staff ..... - Implementation staff .....  - Implementation staff (UC) ..... - As above
15. Has agribusiness and other support industries been involved?	M	A. Have support industries participated in SUEEP?  B. Did support industries increase their interest & involvement in conservation practices?	i) Awareness of SUEEP & SUEEP sub-programs/components ..... ii) Number of members of support industries attending SUEEP activities .....  i) Degree to which industry has responded to changing needs ..... ii) Number of new methods/products developed and introduced .....	- Survey of target groups (overlap with evaluation issue ii) - Sub-program records (TA; SCI) - Survey of target groups  - Survey of farmers (1993) - Implementation staff (LD; TA; SCI) - Survey of target groups - Implementation staff (LD; TA; SCI)
16. Has the introduction of conservation practices raised new farm management or environmental issues?	N	A. What new farm management issues have been raised?	i) Catalogue & description of new issues ..... ii) Effect of new issues on attractiveness of conservation practices .....	- Survey of farmers (1993) - Implementation staff (LD; TA; SCI) - As above

# EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
		<p>B. What new environmental issues have been raised (e.g., changes in fertilizer/pesticide use, toxic chemical buildup, etc.)</p>	<p>i) Catalogue &amp; description of new issues</p> <p>ii) Opinions on importance of new environmental issues</p>	<p>. Environmental monitoring data</p> <p>. Expert opinion (MOE officials)</p> <p>. Expert opinion (MOE officials)</p>
17. Have there been any other unintended impacts of the program?	H		<p>i) Catalogue, description, &amp; opinions on importance of other unintended impacts</p>	<p>. Sub-program records</p> <p>. Implementation staff</p> <p>. Survey of farmers (1993)</p> <p>. Survey of target groups</p>
18. Does the program complement/overlap duplicate other efforts in soil and water conservation?	H	<p>A. What other programs or initiatives deal with soil &amp; water conservation issues?</p> <p>B. How has SUEEP coordinated with these efforts?</p>	<p>i) Catalogue of other efforts &amp; description of objectives &amp; activities</p> <p>i) Mature &amp; degree conflict/complementarity with SUEEP</p>	<p>. Implementation staff</p> <p>. Survey of target groups (rural organizations)</p> <p>. Survey of target groups (rural organizations)</p> <p>. Review of other initiatives by evaluation team</p>
19. Is the organizational structure of SUEEP appropriate to the delivery of the program?	H	<p>A. Did sub-programs overlap/complement each other? Were activities coordinated?</p> <p>B. Was the organizational structure too complex?</p>	<p>i) Same as 14A</p> <p>i) Opinions on the effectiveness of separating federal &amp; provincial responsibilities</p> <p>ii) Opinions on Management Committee's effective control over SUEEP activities</p> <p>iii) Opinions on appropriateness of contracting out federal components (with respect to cost-effectiveness, quality</p>	<p>. Same as 14A</p> <p>. Management Committee</p> <p>. Implementation staff</p> <p>. As above</p> <p>. Implementation staff</p> <p>. Management Committee</p> <p>. Survey of target groups</p>



# EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
			of work, coordination of SLEEP activities, development of private sector expertise)	
			(iv) Opinions on this question	As above
		C. Did the program structure optimize the flow of information to various staff, target groups, & the farming community?	<ul style="list-style-type: none"> <li>i) Delays caused by the administrative &amp; review process (including reviews by TAP, contract approvals by DSS)</li> </ul>	<ul style="list-style-type: none"> <li>Program &amp; sub-program records</li> <li>Implementation staff</li> <li>Management Committee</li> </ul>
			(ii) Use & importance of information from federal components to extension workers	Findings of research question 8D
			(iii) Availability & timeliness of information	Findings of research question 8D
20. Are available resources commensurate with activities and objectives?	N/A	A. Did sub-programs operate within budgets? Below budgets?	i) Expenditures as percent of budgets by component	Sub-program records
		B. Were activities curtailed due to budget constraints?	<ul style="list-style-type: none"> <li>i) Requests for additional funding</li> <li>ii) Opinions on this question</li> </ul>	<ul style="list-style-type: none"> <li>Sub-program records</li> <li>Implementation staff</li> <li>Management Committee</li> </ul>
21. Is a five-year period long enough to achieve program (and sub-program) objectives?	N	A. Was sufficient data collected?	i) Representativeness & reliability of data	Data item 8A(ii)
		B. Were evaluations of conservation practices available soon enough to be fully incorporated into extension services?	<ul style="list-style-type: none"> <li>i) Importance of evaluations in recommendations to farmers</li> <li>ii) Opinions on future impact of information base</li> </ul>	Data item 8B(ii) & (iv) Data item 8E

## EXHIBIT 4.1: RESEARCH QUESTIONS, DATA ITEMS AND DATA SOURCES

Evaluation Issue	Priority	Research Questions	Data Items	Data Sources
22. Are there more cost-effective programs that would achieve the same objectives?	N	A. Was there an appropriate allocation of funds between the research & development components of the program?	i) Opinions on this question ..... ii) Findings from other issues (esp. evaluation issue 20)	. Management Committee . Implementation staff (esp. TAP) ..... . Sources for other issues
		B. What changes to program structure are needed?	i) Findings from other issues (esp. evaluation issues 18, 19, 20) ..... ii) Opinions on this question	. Sources for other issues ..... . Management Committee . Implementation staff
		C. What changes to program activities are needed?	i) Findings from other issues (esp. evaluation issues 8 and 11) ..... ii) Opinions on this question	. Sources for other issues . Management Committee . Implementation staff . Survey of farmers (1993) . Survey of target groups ..... . Same as above

## ABBREVIATIONS

CIC	Conservation Information Centre
EMMC	Environmental Monitoring & Modelling Committee
FLEA	Farm Level Economic Analysis Component
LD	Local Demonstrations sub-program
PDM	Pilot Demonstration Watersheds sub-program
PI	Public Information component
SCI	Soil Conservation Incentives sub-program
SEE	Socioeconomic Evaluation component
T-2000	T-2000 demonstration plots (part of Local Demonstrations sub-program)
TA	Technical Assistance sub-program
TAP	Technology Assessment Panel
TED	Technology Evaluation & Development component
UC	Working Committee

the technical reports for the Pilot Demonstration Watershed Program, provide estimates of reductions in phosphorus runoff per hectare for each of the watersheds.

To estimate total potential reduction in phosphorus in the SWEEP area using best available technology (data item 2A(ii)), these per hectare reductions must be applied to the SWEEP area. The estimated per hectare reductions may vary according to the characteristics of each demonstration watershed; that is, the effectiveness of best available technology will vary according to soil and climate conditions, drainage characteristics (potential erosion, landscapes), crop types, etc. To estimate total reductions, the amount of farmland conforming to the characteristics of each of the demonstration watersheds must be identified. This information will be embodied in the EMMC model. Depending on the final structure of the EMMC model, it may be used directly to calculate total potential reductions in the SWEEP area.

If, from the above analysis, the target of 200t/yr is not achievable with BAT (i.e., best available technology will reduce runoff less than 200t/yr), then the target may be achievable using new, more effective technologies and practices. The potential reduction in phosphorus runoff from new technologies can be estimated in the same manner as for BAT reductions. Potential per hectare reductions in phosphorus (effectiveness values) for new technologies will be documented in the technical reports from the Technology Evaluation and Development component. Again, effectiveness values will be specified by soil, climate, and other characteristics. The EMMC model will contain information on the distribution of SWEEP farmland by these characteristics as well as algorithms to calculate total potential reductions from new technologies in the SWEEP area.

The effectiveness values for new technologies will be available on a technology-specific instead of a watershed level. The analysis of potential reductions for new technology should, therefore, consider

combinations of technologies which may be implemented in any particular area.<sup>1</sup>

Research questions 2C and 2D address the appropriateness of the 1990 target date. In question 2C, Agreement Documentation is to be reviewed for information on the background and rationale for 1990 date. The review may or may not identify empirical evidence on which the target date was based. Research question 2D provides some empirical analysis to evaluate the appropriateness of the 1990 date. Using estimates of potential reduction per hectare (from OMAF agriculture statistics), the number of farms which must adopt best available technology in order to achieve the target could be estimated. The likelihood of this number of farmers adopting conservation practices by 1990 would then be assessed on the basis of experts' (agrologists') opinions.

#### Evaluation Issues 5, 6 and 7

Evaluation issues 5, 6 and 7 address how the program achieves its stated objectives of:

- . reducing phosphorus by 200 tonnes per year by 1990; and
- . maintaining or improving the productivity of southwestern Ontario agriculture by reducing or arresting soil erosion and degradation.

The analysis of these issues is based on identifying changes in land management practices, the impacts of those changes (in terms of

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<sup>1</sup>As recommended in Section 4.2, data collected from the Technology Evaluation and Development plots should conform to the data required for the EMMC model. If, for some reason, data on new technologies do not conform to the model's requirements, a rough estimate of the capability of new technologies to reduce phosphorus runoff in the SWEEP area can be based on the estimate of reductions using best available technology in the following manner:

- . Compare per hectare reductions of new technologies and best available technologies;
- . Compare the applicability of best available technology and new technology (e.g., # of hectares suitable to either set of technologies);
- . Adjust estimates of potential reductions from best available technology according to differences with new technologies in terms of effectiveness and applicability.

phosphorus runoff, agronomic and economic indicators) and the role of SWEEP in achieving those impacts. Estimation of the reduction in phosphorus runoff directly overlaps with the mandate of the EMMC, and all endeavours in addressing this issue should be closely coordinated with the committee.

Changes in land management practices (research question 5A) are measured as the number of hectares where conservation technologies or practices have been implemented during the program. The number of hectares will be identified by technology/practice, soil and climate regions, and other important characteristics. These data will be drawn from the surveys of land management practices undertaken in 1986 and 1993. Specifically, the survey in 1993 will cover all land parcels included in the 1986 survey and identify changes in land management practices.

The impacts of conservation practices are identified in "effectiveness values." Effectiveness values include:

- . reduction in phosphorus runoff per hectare
- . percent changes in yield per hectare, change in soil runoff per hectare and soil quality parameters
- . percent change in net income per hectare

Effectiveness values will be defined by technology and may be differentiated by soil region, climate region, etc. The level of disaggregation will depend on the nature of the data collected from each test plot, the number of observations, and the reliability of the data. Effectiveness values will be taken from analysis of test plots in the Pilot Demonstration Watershed sub-program, the T-2000 projects and, if appropriate, the Technology Evaluation and Development plots. The analyses will be documented in the sub-program technical reports. Data from EMMC-sponsored field tests may also be used.

The total change in phosphorus runoff and agricultural productivity indicators for the SWEEP area is estimated by combining the number of hectares converted to conservation technologies and effectiveness



values for those technologies. For example, the survey of land management practices provides an estimate of the amount of land converted to a technology since 1986. The sample estimate is then extrapolated to the SWEEP area. The change in phosphorus per hectare per year for technology A is then multiplied by the number of hectares converted to that technology. Summing across technologies yields an estimate of actual changes in phosphorus runoff in the SWEEP area.

The purpose of the EMMC model is to perform these calculations using, as input, effectiveness values and sample data from the survey of land management practices. The EMMC model can also be used to calculate changes in agronomic and economic indicators to the SWEEP area by substituting the change in phosphorus with other effectiveness values.

Attributing changes in phosphorus runoff and agronomic and economic indicators to SWEEP (research questions 5D, 6E, and 7B in Exhibit 4.1) relies on findings from the evaluation of the incremental effects of SWEEP (evaluation issue 11). Specifically, findings from research question 11C (data items (ii) and (iii)) identify the percent of land which would not have adopted conservation practices in the absence of SWEEP. This percentage is then used to prorate total changes in phosphorus runoff and agronomic and economic indicators (as calculated in research questions 5A, 6A, 6B, 6C, and 7A). Prorating could be based on a single average percentage, or, using the EMMC model, take into consideration differing effects across regions.

#### Evaluation Issue 8

Evaluation issue 8 addresses the usefulness and reliability of the information base generated under SWEEP. As indicated in Exhibit 4.1, the key components in analyzing this issue are:

- . identify information which has been documented (research question 8A);
- . evaluate the quality of the information (research question 8B);
- . determine availability of the information (research question 8C);
- . determine use of the information base and its contribution to the adoption of conservation practices (research question 8E).



To address the first of these components, information on the number of technologies evaluated and the number of research projects funded is drawn from records of the appropriate sub-program (i.e., Technology Evaluation and Development, Farm Level Economic Analysis, Pilot Demonstration Watersheds, Local Demonstrations, and Socioeconomic Evaluations).

The second research question addresses the quality of the evaluations and the degree to which they can support generalized recommendations. This review will be based primarily on the opinions of experts in soil and water conservation and economic analysis. Implementation staff are another source of information. Opinions of the members of the Technology Assessment Panel should be solicited as to the comprehensiveness of the evaluations and their relevance to farmers. Authors of the evaluation (i.e., implementation staff of the Technology Evaluation and Development and Farm Level Economic Analysis components and Pilot Demonstration Watersheds sub-program) are most familiar with the details of each evaluation and can comment on data weaknesses, important assumptions, and qualifications to the analyses.

To address the next two components of the evaluation issue (research questions 8C and 8D) requires input from the users and potential users of the information. The appropriate user group will depend on the type of information generated. For example, the main clientele for the Technology Evaluation and Development, Farm Level Economic Analysis, Pilot Demonstration Watershed evaluations are implementation staff of the provincial programs, in particular, extension staff. To ascertain the usefulness of these evaluations, therefore, extension staff should be asked whether they are aware of the research and whether it is readily available. They could also be asked to comment on the importance of that information in making recommendations to farmers and agri-business. On another level, the opinions of farmers and members of target groups should be solicited to assess the availability and usefulness of information provided through the extension staff.

Finally, the intent of the federal components of SWEEP is to develop an information base which will support and encourage the adoption of conservation practices even after the termination of the program. Opinions on the future usefulness of the information base should be solicited from implementation staff (especially extension workers) who have a broad overview of farmers' attitudes and their needs.

#### Evaluation Issues 9 and 10

Evaluation issues 9 and 10 focus on less tangible impacts of the program: changes in awareness of soil and water quality issues and attitudes towards conservation practices. The main data sources for these evaluation issues are the surveys of farmers and target groups. These surveys can be supplemented by the opinions of implementation staff who have direct contact with the farmers and agri-business representatives and are often involved in land management decisions.

Data items listed for evaluation issues 9 and 10 in Exhibit 4.1 vary from survey statistics to more in-depth analyses of perceived barriers to adoption of conservation practices. Data items include:

- . percent of farmers aware of soil and water quality issues
- . percent of farmers ranking soil and water quality issues as important or very important
- . catalogue and assessment of severity of barriers to adoption of conservation practices
- . percent of farmers familiar with various conservation practices.

#### Evaluation Issue 11

Evaluation issue 11 assesses the incremental effects of SWEEP: it analyzes the degree to which changes in awareness, attitudes and practices are attributable to program activities. As indicated in Exhibit 4.1, the analysis of this issue is broken into three research questions. The first research question (11A) assesses the degree to which the public is aware of the SWEEP program. As a starting point, an inventory of activities directly involving the public is drawn up from records of the Local Demonstration, Technical Assistance, Public Information and Soil Conservation Incentives sub-programs (see data

items 5A (i) - (iv) in Exhibit 4.1). Indicators of public awareness of these activities can be derived from the survey of farmers and target groups (data item 5A(v)).

The second and third research questions focus on the effect of SWEEP on changing awareness of soil and water quality issues, attitudes towards conservation practices, and the extent to which conservation practices would have been adopted in the absence of the program. For both research questions, the primary data sources are the surveys of farmers and target groups. The survey of farmers should identify sources of information that have affected awareness of attitudes, the relative importance of SWEEP information or assistance in land management decisions, and finally, the percent of farmers who feel they would not have implemented conservation practices without SWEEP assistance.

Research question 11B -- the extent to which adoption of conservation practices is attributable to SWEEP -- is particularly important as it serves as the basis for the incrementality factor used in determining the achievement of SWEEP's stated objectives. The incrementality factor should, initially, be based on data item C(iii) but may be adjusted depending on the importance of SWEEP assistance in conservation decisions (data item 11C(ii)) and the incidence of SWEEP-stimulated developments in agri-business industries (data item 11C (iv)).

#### Evaluation Issue 23

Evaluation Issue 23 -- are there more cost-effective programs that would achieve the same objectives as SWEEP? -- draws together opinions on the structure of the program, the allocation of funds between components of the program, and program activities. To a large extent, the evaluation of this issue can be based on findings from all other issues. For example, desirable changes to program structure may be identified from the assessment of:

- . the flow of information between sub-programs and to the target groups and farming community (research questions 8C and 19C);

- . the role of SWEEP in relation to other efforts in soil and water conservation (evaluation issue 18); and
- . the adequacy of the services and resources of the Conservation Information Centre.

The Management Committee and implementation staff, who have a thorough understanding of SWEEP's organization and environment, are also important sources of information for this issue. Finally, farmers and members of target groups — as clients of the program — can assist in identifying unnecessary activities or missing links.

#### 4.2 Description of Information Sources

The purpose of this section is to describe the information sources required to address evaluation issues. Identification of information sources was based on interviews with SWEEP program personnel and a review of SWEEP program documentation. Some of the required information will be produced as part of sub-program activities; some will necessitate new surveys and/or interviews.

Exhibit 4.2 lists evaluation issues together with their information sources. Information sources have been grouped as:

- . Documentation
- . Surveys
- . Interviews.

It is recommended that ten major information sources be considered for the evaluation of high priority issues. These main information sources are:

- . Documentation
  - . Agreement documentation
  - . Program documentation  
(administration records; data and technical reports)
  - . EMMC model
- . Surveys
  - . Inventory of land management and cropping practices

- . Survey of farmers
- . Survey of target groups
- . Interviews
  - . Implementation staff
  - . Management Committee
  - . Experts

Four additional information sources were identified to address medium and low priority issues or to supplement the analysis of high priority issues. These additional information sources are:

- . Documentation
  - . Environmental monitoring data
  - . EMMC-sponsored field tests
  - . Published statistics
- . Surveys
  - . Survey of soil conservation incentive grant applications

Each information source is described below.

#### 4.2.1 Main Information Sources

##### Documentation

##### (1) Agreement Documentation

Agreement documentation refers to reports and studies which provide background to the SWEEP agreement. Agreement documentation includes studies related to the water quality objectives (in particular supporting documentation for the Canada-Ontario Agreement and the Canada-U.S. Agreement on Great Lakes Water Quality) and soil quality objectives (e.g., Senator Sparrow's study and the PLUARG studies). The Phosphorus Load Reduction Plan is of particular value.

Agreement documentation is an important information source for evaluation of issues related to program rationale. Specific data or information items to be drawn from agreement documentation are:

- . rationale/justification for reducing phosphorus runoff
- . basis for the 1990 target date
- . other sources of non-point phosphorus runoff
- . relative costs of other methods of reducing non-point phosphorus runoff



# EXHIBIT 4.2: DATA SOURCES FOR EVALUATION ISSUES

Evaluation Issue	Documentation							Surveys			Interviews		
	Agreement Document	Program Records	Program Data/Report	EMSC Model	EMSC Sponsored field trials	Environ-mental Non-Data	Published Statistics	Land Use/Management Practices	Farmers Interest Groups	SCI Grant Applicants	Implementa-tion Staff	Meet. Comm.	Indep. Experts
1. Is there a need to reduce phosphorus runoff to Lake Erie?	X												X
2. Is a target of 200 t/yr by 1990 achievable?	X	X	X	X			X						
3. Are changes in agricultural practice the best approach to decreasing non-point phosphorus runoff?	X												
4. Is there a need to reduce soil erosion and degradation?	X												
5. Has phosphorus runoff been reduced by 200t/yr by 1990?			X	X	X			X					
6. What has been the impact on agricultural productivity with respect to agronomics (including yields, soil yields, erosion, and degradation)?			X	X	X			X					X
7. What has been the impact on agricultural productivity in terms of farm income?			X					X					
8. Has the program produced a useful and reliable information base?		X	X						X	X		X	X
9. Has awareness of soil and water quality issues changed?		X							X	X			



## EXHIBIT 4.2: DATA SOURCES FOR EVALUATION ISSUES (cont.)

Evaluation Issue	Documentation						Surveys			Interviews		
	Assessment Document	Program Records	Program Data/Report	EMMC Model	EMMC Sponsored field tests	Environ-mental Mon. Data	Published Statistics	Land Maint. Practices	Farmers Groups	SCI grant Applicants	Implementa-tion Staff	Host. Indo. Comm. Expert
10. Has the conservation ethic been promoted?		X		X					X		X	
11. To what extent can changes be attributed to SUEEP?									X			
12. Has the program stimulated further research or developed expertise in soil and water conservation?	X										X	X
13. Has the program contributed to our understanding of the technology transfer process?		X		X							X	X
14. Has the program enhanced cooperation between implementing agencies?											X	
15. Has agri-business and other support industries been involved?	X								X	X	X	
16. Has the introduction of conservation practices raised new farm management or environmental issues?						X			X		X	X
17. Have there been any other unintended impacts?	X								X	X	X	
18. Does the program complement/overlap/duplicate other efforts in soil and water conservation?									X		X	X
19. Is the organizational structure of conservation techniques appropriate to the delivery of the program?	X								X		X	X

EXHIBIT 4.2: DATA SOURCES FOR EVALUATION ISSUES (cont.)

Evaluation Issue	Documentation						Survival			Interviews		
	Agreement Document	Program Records	Program Data/Report Model	EMHC Sponsored field tests	EMHC Mon. Data	Published Statistics	Land Mgmt. Practices	Farmers Groups	Target Groups	SCI Grant Applicants	Integren: Station Staff	Mont. Expert Comm.
20. Are available resources commensurate with activities and objectives		X									X	X
21. Is a five-year period long enough to achieve program (and sub-program) objectives?								X	X		X	X
22. Are there more cost-effective programs that would achieve the same objectives?												

- . documentation of soil loss problem and implications for agricultural productivity.

## (2) Sub-Program Documentation - Records

Sub-program records include management reports (e.g., sub-program managers' quarterly reports to the Working Committee, consultants' monthly progress reports) and administrative information on program and sub-program activity (e.g., the number and value of grants awarded). Sub-program records will be used as a source of information on program activity and, as such, data items vary by sub-program:

Sub-Program	Data Item
Conservation Information Centre	<ul style="list-style-type: none"> <li>. no. of requests/visits</li> <li>. catalogue of SWEEP reports</li> <li>. amount of private funding</li> </ul>
Socioeconomic Evaluations	<ul style="list-style-type: none"> <li>. no. of funded projects</li> <li>. relevance of research results to SWEEP objectives</li> <li>. no. of research projects specifically addressing technology transfer issues</li> </ul>
Technology Evaluation and Development	<ul style="list-style-type: none"> <li>. no. of technologies tested and evaluated</li> </ul>
Farm Level Economic Analysis	<ul style="list-style-type: none"> <li>. no. of technologies evaluated</li> </ul>
Pilot Demonstration Watersheds	<ul style="list-style-type: none"> <li>. no. of watersheds implemented and completed</li> <li>. no. of technologies evaluated</li> </ul>
Local Demonstrations	<ul style="list-style-type: none"> <li>. no. T-2000 plots</li> <li>. no. of side-by-side plots</li> <li>. no. of projects funded through the OSCIA grant</li> <li>. no. of different technologies demonstrated</li> <li>. no. T-2000 technologies evaluated</li> </ul>
Technical Assistance	<ul style="list-style-type: none"> <li>. no. of meetings/workshops/on-farm demonstrations and tours</li> <li>. no. of farm visits</li> <li>. no. of fact sheets and articles published</li> <li>. no. of farmers assisted</li> <li>. no. of farmers participating in sub-program activities</li> </ul>

- . no. of agribusiness representatives participating in sub-program activities
- Soil Conservation Incentives . no. of grants awarded
- . catalogue of problems resolved

Information on program activity is needed for evaluation of the information base (issue 8) and the incremental effect of SWEEP in encouraging the adoption of conservation practices (issue 11).

In addition, sub-program records provide information on unintended impacts (issue 18) and administrative issues (e.g., delays caused by program structure, program expenditures) used to evaluate program design, delivery, and alternatives.

### (3) Program Documentation - Data and Technical Reports

Over the course of SWEEP, considerable data will be collected and then analyzed and synthesized into technical reports. This information — which is the main output of several program components — is intended to identify and promote specific conservation technologies.

The information will also be used to evaluate the achievement of overall program objectives. In particular, test results from demonstrations of conservation technologies will form the basis on which changes in phosphorus and agricultural productivity will be estimated for the region as whole. In order to estimate the change associated with new management practices (as identified in the land management practices survey), changes in phosphorus, soil runoff, soil quality parameters, and economic indicators must be estimated for each individual technology. These technology-specific data should be collected at the plot level.

Ideally, all technologies introduced or used by farmers in the land management survey would be field tested. Technologies should be tested in each of the major soil/climate regions of southwestern Ontario and at more than one location in each region. The amount of data required, therefore, is substantial and information from all possible demonstration plots should be considered.

Technology-specific data items (to be collected at the plot level) are:

- . change in phosphorus runoff
- . change in soil runoff
- . change in soil quality parameters (i.e., chemical, fertility, organic matter content)
- . change in yield
- . change in gross revenues
- . change in net income.

All data should be expressed in per hectare units in volume terms or as percent changes.

These data can be collected from the pilot demonstration watershed demonstrations and are part of that program's current design. Data on the economic implications of the pilot demonstration watersheds technologies will be analyzed and documented by the Farm Level Economic Analysis component of SWEEP.

Local demonstration projects could also produce technology-specific data but, to our knowledge, data collection is not officially part of the sub-program's activities. Similarly, technology-specific data could be collected as part of the Soil Conservation Incentive sub-program by asking grant recipients to maintain records on agronomic and economic indicators and by measuring phosphorus and soil runoff and quality parameters. At present, data collection is not officially part of this sub-program's activities.

Evaluation issues related to both program rationale and objectives achievement call for estimates of potential changes in phosphorus loadings associated with best available technology. Because best available technology involves combinations of technologies or conservation systems, data must be collected at a more aggregated level -- for the farm and watersheds. Data items correspond to those required at the plot level and will be collected as part of the planned activities of the Pilot Demonstration Watersheds sub-program and the Farm Level Economic Analysis component.

The survey of land management practices may identify new technologies that have been adopted. In this case, data from Technology Evaluation and Development projects may be used to help evaluate the achievement of program objectives. These data will also contribute to estimating potential reduction in phosphorus runoff and evaluating the program's target of 200t/yr (evaluation issue 2). Data items to be collected on an on-going basis by the sub-program are:

- . change in phosphorus loadings
- . change in soil runoff
- . change in soil quality parameters
- . change in yields
- . change in economic indicators.

We understand that collection of soil runoff, soil quality, agronomic and economic data is currently part of the sub-program's (planned) activities. Data on phosphorus runoff should also be gathered.

The research sponsored by the Socioeconomic Evaluations component may provide important insights and data on technology transfer and changes in awareness and attitudes. X

Technical reports of all sub-programs will be reviewed to evaluate the information base which has been created by SWEEP.

#### (4) EMC Model

The Environmental Monitoring and Modelling Committee (EMMC) was created in response to a COA Review Board directive and operates outside the SWEEP program. The committee is responsible for overseeing "the development of a plan to ascertain the effectiveness of the point and non-point source phosphorus reduction measures". During the implementation of SWEEP, the committee will review, select, and/or adapt (as necessary) an appropriate model for extrapolating sample results from the survey of land management practices and calculating changes in phosphorus runoff, and agronomic and economic indicators for the SWEEP area.



The EMMC and implementation staff for the pilot demonstration watersheds, T-2000 plots and Technology Evaluation and Development should work closely together to ensure that all necessary data is collected at the appropriate level (e.g., technology, farm, or watershed). This coordination will be facilitated by the overlap of EMMC members and SWEEP implementation staff.

## Surveys

### (1) Survey of Land Management and Cropping Practices

The survey of land management and cropping practices inventories soil conservation and cropping practices used in the SWEEP study area. The survey should be carried out at two different time periods: once at the beginning of the program and once at its conclusion.

The initial survey was undertaken in the summer of 1986. Data was collected on:

- . owner and/or operator's name, address, telephone, township, county, etc.
- . detailed descriptions of the cropping practices, tillage practices, seedbed preparation, planting, and fertilizer use for each of up to ten fields per farm
- . land management practices by source of funding
- . sources of conservation information
- . enterprise characteristics (including years of farming the parcel, size, major enterprise, livestock numbers)
- . operator's age.

Diagrams of present patterns of fields on the farm were also completed. The survey taken at the end of the program should collect data on all of the above factors. Questions related to the performance of conservation practices which have been implemented over the course of the program should also be included. These questions would collect qualitative information on, for example, effects of conservation

practices on yield, soil quality, economic indicators, and farm operation.

## (2) Survey of Farmers

This survey would focus on farmer's awareness of soil and water quality issues, attitudes towards conservation practices and the prevalence of the conservation ethic and use of SWEEP information or assistance. Ideally, the survey would be conducted twice: once at the beginning and again at the end of the program.

The initial survey would provide baseline data from which changes in awareness and attitudes can be detected. Without the initial survey, identifying changes would depend on recollections (e.g., "Have your attitudes towards conservation practices changed in the last five years?") which would produce less reliable results. Data items to be collected in the initial survey are:

- . awareness of soil quality issues
- . awareness of water quality issues
- . importance of soil and water quality issues
- . knowledge and understanding of conservation practices
- . major barriers to adoption of conservation practices
- . the degree to which soil and water quality issues are considered in farm management decisions.

In the concluding survey, data should be collected on all of the above factors as well as on:

- . awareness of SWEEP and its sub-programs
- . participation in SWEEP activities (e.g., meetings, workshops, tours of demonstration farms)
- . sources of information/influence which affected awareness of soil and water quality issues, attitudes towards and adoption of conservation practices
- . the importance of SWEEP information or assistance in adopting conservation practices
- . the usefulness and credibility of information generated by SWEEP

- . opinions regarding changes in the structure, activities, or outputs of the SWEEP program.

The survey of farmers should include, but not be limited to, the survey of land management and cropping practices.

### (3) Survey of Possible Target Groups

Possible target groups for SWEEP include agri-business, professional agrologists, consultants, rural and other organizations involved in conservation, the research community, and extension and farm management services and conservation authorities outside the SWEEP study area. (Extension and farm management services and conservation authorities in the SWEEP study area are part of implementation staff — see below).

These target groups define a clientele for SWEEP which extends beyond the farm community. The evaluation of the program should take into account its effects on these target groups. The evaluation should, for example, examine the usefulness of the results of the Pilot Demonstration Watersheds and Technology Evaluation and Development sub-programs to extension workers outside the SWEEP region and the use of the Conservation Information Centre by the research community, agrologists, agri-business, and rural organizations. The opinions of members of these target groups, are important in evaluating the achievement of objectives as well as issues related to:

- . other impacts and effects; and
- . program alternatives.

The main data items of the survey of target groups would include:

- . awareness and perceived importance of soil quality and water quality issues
- . attitudes towards and understanding of conservation practices
- . new products, expertise, research activity initiated into soil and water quality and conservation practices
- . awareness of SWEEP and its sub-programs
- . the perceived effectiveness of SWEEP in promoting the conservation

ethic, research, product development and adoption of conservation practices

- . unintended impacts of the program
- . availability and use of information generated by SWEEP
- . opinions towards technical reports and information generated by SWEEP (i.e., credibility, usefulness)
- . information and opinions related to the Conservation Information Centre

For some research questions, data need be collected from only one target group. For example, questions on the level of university research into soil and water conservation issues will be included on the survey of researchers only. Questions specific to one target group are appropriately noted in Exhibit 4.1.

## Interviews

### (1) Implementation Staff

Implementation staff include sub-program managers, consultants responsible for sub-program implementation, members of the Working Committee, and field staff. Field staff include extension workers and conservation authorities, the staff at the Conservation Information Centre and members of the Technology Assessment Panel.

Implementation staff are one of the single most important sources of information for the evaluation study. Implementation staff are best informed and have a detailed understanding of sub-program activities. They also have an appreciation of linkages within the program and the usefulness of activities and products of sub-programs other than their own.

Furthermore, implementation staff of some sub-programs are clients of other sub-programs. For example, evaluations of the Farm Level Economic Analysis component and Pilot Demonstration Watersheds sub-program constitute (part of) the information base on which extension staff make recommendations to farmers. The evaluation study should,

therefore, capture the opinions of implementation staff for the three provincial sub-programs on the value of these evaluations.

Questions and perceptions discussed with implementation staff will vary according to sub-program, as noted in Exhibit 4.1.

## (2) Management Committee

Interviews with members of the SWEEP Management Committee will focus on issues of policy and program structure. Specific questions to be addressed by Management Committee members include:

- . Were research results from the Socioeconomic Evaluation component incorporated into policy decisions?
- . Did the program enhance cooperation between implementing agencies? Were any new cooperative efforts initiated?
- . Were sub-program activities coordinated?
- . Did the separation of federal and provincial responsibilities enhance program effectiveness?
- . Did Management Committee have effective control over SWEEP activities?
- . What changes to program structure are needed?
- . What changes to program activities are needed?

Both current and past members of the Management Committee should be interviewed.

## (3) Independent Expert Opinion

The primary outputs of the Technology Evaluation and Development, Farm Level Economic Analysis components and the Pilot Demonstration Watersheds sub-program are technical reports assessing conservation technologies or technology systems. The normal approach to evaluating studies programs is to query users of the studies as to their usefulness. For these three sub-programs/components, study users are other program staff, agrologists, consultants, agri-business, and the research community. Their opinions will be gathered from interviews with implementation staff and the survey of target groups.

Reports may also be reviewed by an independent expert drawn from the consulting or academic communities. The independent review would cover technical quality in terms of:

- . completeness
- . degree to which results can support generalized recommendations
- . data reliability
- . representativeness of the data and conclusions
- . methodology
- . presentation.

Expert opinion will also be useful in assessing the implications of unintended environmental issues associated with conservation practices (evaluation issue 16).

#### 4.2.2. Supplementary Information Sources

Four additional information sources are identified in Exhibit 4.1. These information sources are considered supplementary because they are required only to address medium or low priority issues or are of secondary importance in addressing high priority issues. The supplementary information sources are:

- . Environmental monitoring data
- . EMC-sponsored field tests
- . Published statistics
- . Survey of soil conservation grant applicants

EMC-sponsored field tests refer to data from tests of conservation technologies funded by the EMC, independently of SWEEP. The primary purpose of these tests is to estimate changes in phosphorus runoff, but may (or could) also provide information on agronomic and economic indicators.

Published statistics refer to agricultural statistics published by OMAF.



Environmental monitoring data would provide information on the implications of conservation practices for environmental parameters other than phosphorus, thereby identifying any new environmental issues or problems (issue 16). Collected at either the plot or watershed level, these data would be an adjunct to current activities for both the Technology Evaluation and Development and Pilot Demonstration Watershed sub-programs.

The survey of Soil Conservation Incentive grant applicants would include both grant recipients and rejected applicants. The purpose of this survey would be to determine the usefulness of the grant (e.g., were amounts adequate, would the conservation structures have been implemented without the grant) and the performance of sub-program staff in terms of providing advice and assistance.

We recommend that the survey of Soil Conservation Incentive grant applicants not be considered in any evaluation option because the expense of the survey is disproportionate to its contribution in evaluating the program as a whole.

#### 4.2.3 Schedule for Information and Data Collection

Collection of information and data will occur at various stages of program implementation:

##### Program Start-up

Initial data collection activities are:

- . survey of land management and cropping practices
- . survey of farmers

Interviews for the land management survey were completed in 1986 and are currently being analyzed. To our knowledge, there are no plans to undertake an initial survey of farmers.

### During Program Implementation

Information collected on an ongoing basis includes:

- . program documentation — records
- . program documentation — data and technical reports
- . environmental monitoring data

Of particular importance is collection of data on phosphorus runoff, soil runoff, soil quality, and economic indicators associated with (i) individual conservation technologies and (ii) conservation systems.

Technology-specific data collection is included in the stated activities of the Technology Evaluation and Development and Pilot Demonstration Watershed sub-programs. To the extent possible, technology-specific data should also be collected under the Local Demonstration sub-program. Data on conservation systems will be collected at the watershed level under the Pilot Demonstration Watershed sub-program.

Environmental monitoring data can be collected as an adjunct to the above mentioned activities.

### Mid-Term

If a mid-term evaluation is undertaken, data collection activities part way through the program would include:

- . interviews with implementation staff
- . interviews with Management Committee
- . selected interviews with target groups
- . selected interviews with (or limited survey of) farmers.

### Program Termination

Major data collection activities at the conclusion of the study would be:

- . review of Agreement documentation
- . integration with EMM model and data from EMM-sponsored field tests
- . surveys of:
  - . land management and cropping practices
  - . farmers

- . target groups
- . interviews with:
  - . implementation staff
  - . Management Committee
  - . independent experts.

## 5.0 EVALUATION OPTIONS

Several factors were considered in identifying and selecting evaluation options for SWEEP:

### 1. Level of Effort

Level of effort refers to the cost of evaluation options. Evaluation options should represent varying levels of effort so that an appropriate choice may be made in the context of budget and time allowances, and evaluation needs at the time of the evaluation study.

### 2. Disparate Time Lines

The SWEEP Agreement ends in 1990. Provincial sub-programs under SWEEP are scheduled to terminate with the Agreement in 1990. The federal portion of SWEEP, however, has been reprofiled so that it will end in 1993. The disparate time lines for the provincial and federal components of SWEEP raise questions as to whether an evaluation should be done in 1990, 1993, or at both dates. Because of the structure of SWEEP, and the linkages between sub-programs, the date for the evaluation will affect the comprehensiveness of the results. If, for example, the evaluation were done in 1990, very limited results would be available from the federal sub-programs, this information would not have been passed on to farmers, and, consequently, the impacts of the federal sub-programs in encouraging conservation practices would not be fully captured. If, however, provincial sub-programs are not extended, it would be much more difficult to identify the incremental effects of SWEEP in a 1993 evaluation.

### 3. Mid-term Review

The mandate of the Monitoring and Evaluation Committee is to develop a framework for both mid-term and final evaluations of SWEEP. This mandate is reflected in the Terms of Reference for the Evaluation Assessment.

The desirability of a mid-term evaluation should not be assumed, but should itself be assessed in terms of:

- . availability of data at mid-term
- . usefulness of results (e.g., in terms of adjusting the characteristics of the program)
- . cost
- . special considerations raised by disparate time lines of the federal and provincial program components (see above).

In addition, monitoring activities built into the SWEEP management structure may mitigate the need for a formal mid-term review.

### 4. Work Undertaken Outside SWEEP

SWEEP is integrated with other (non-SWEEP) activities of Environment Canada, the Ontario Ministry of Environment, and the EMMC. Specifically, the EMMC is responsible for estimating the change in phosphorus transport to the Lake Erie Basin. In responding to requirements of the Canada/Ontario and Canada/U.S. agreements on Great Lakes water quality, the EMMC may undertake periodic analyses of changes in phosphorus runoff. For example, the U.S. plan for phosphorus reduction is scheduled to terminate in 1990, at which time Canada may respond with information on the progress of its own phosphorus reduction plan. This may involve a survey of land management practices and data collection and analyses relevant to SWEEP evaluation issues in 1989 or 1990.

The timing of the EMMC's evaluations has not yet been determined; however, any work done by the EMMC should be considered and, to the extent possible, incorporated into SWEEP evaluation activities.

Before deciding on the four evaluation options presented below, several other options were considered and eliminated as inappropriate. For example, an evaluation based solely on in-house data (e.g., program records and technical reports, implementation staff) and EMMC analyses was considered inadequate, as it would provide very limited information on the incremental effects of SWEEP. Furthermore, without information on attitudes and opinions of farmers and target groups, this option would have generated little objective insight into the achievement of the program's intermediate objectives (e.g., changing awareness of soil and water quality issues, and attitudes towards the conservation ethic and conservation practices) or issues related to program design, delivery, and alternatives.

Disparate time lines raised a variety of possible evaluation options. One approach which was discussed with SWEEP Management Committee and subsequently discarded was a single evaluation undertaken in 1990.

The single evaluation sticks to the letter of the SWEEP Agreement under which the program officially terminates in 1990. A single evaluation in that year has two disqualifying problems. First, data from the Pilot Demonstration Watersheds and Technology Evaluation and Development sub-programs would be insufficient to reliably estimate changes in phosphorus runoff and agricultural productivity and, hence, preclude reliable assessment of achievement of stated program objectives. Second, the federal sub-program would have been operational for only two seasons by 1990, so an evaluation in that year would not fully capture the contribution of these sub-programs to overall SWEEP objectives.



SWEEP is a complex program, made up of seven sub-programs, covering eleven individual components. One evaluation option would be to evaluate each component individually. This approach involves specifying separate evaluation issues, research questions, data items, and data sources for each component. Conclusions regarding overall program evaluation issues would be drawn from the individual component evaluations.

There is no question that the evaluation of the program as a whole does require some analysis of individual program components; but a component evaluation option has a number of problems: it is considerably more expensive than a program approach; it requires coordination of data collection efforts; it may lead to duplication of analyses; and it may generate information extraneous to program level issues.

Most importantly, key evaluation issues are those related to the program as a whole: the reduction of phosphorus runoff, the improvement in agricultural productivity, the change in awareness and attitudes towards soil and water conservation, and the incremental effects of the program as a whole. As reflected in the preceeding sections of this report, these key evaluation issues can be addressed by drawing on reviews of specific components, as needed. For example, evaluation of the information base generated under SWEEP would include an assessment of the adequacy of the services and resources of the Conservation Information Centre. All of the evaluation options discussed below focus on program level issues; in none of the options do we consider it necessary nor desirable to undertake detailed evaluations for each program component.

Below we describe four evaluation options for carrying out the evaluation study. All four options provide conclusions on the achievement of the program's stated objectives, but differ in their treatment of other evaluation issues. The options are described in terms of data collection activities, coverage of

evaluation issues, and cost. Details of data collection activities (in terms of survey samples, survey instruments) are also noted. All costs are given in 1987 dollars.

#### 5.1 Option A: Minimum Level of Effort

Option A represents the minimum level of effort that should be considered for the evaluation study. Option A would include the following in-house data collection activities:

- . review of program documentation
- . review of program records
- . review of program data and technical reports
- . integration with EMMC model
- . interviews with implementation staff
- . interviews with Management Committee members

It would also involve three surveys:

- . a survey of land management and cropping practices in 1986 and again in 1993; and
- . a survey of farmers in 1993.

Option A excludes the baseline survey of farmers (1987), the survey of target groups, and all supplementary information sources. Furthermore, the use of experts would be limited.

This option includes data sources critical to an adequate evaluation of the achievement of stated program objectives: the survey of land management practices, the EMMC model, and data and technical reports from various sub-programs. The farmer survey in 1993 is included as part of the minimum level of effort because farmers represent the major client group for SWEEP. Without some understanding of the impact of the program on farmers, the evaluation study would inadequately address the following key evaluation issues:

- . Has the program produced a useful and reliable information base?
- . Has awareness of soil and water quality issues changed?
- . Has the conservation ethic been promoted? Have attitudes towards conservation practices become more favourable?

The farmers survey is also critical to determining program incrementality (evaluation issue 11: to what extent can changes in awareness, attitudes, and land management practices be attributed to SWEEP).

The 1993 survey of land management practices should cover all land parcels surveyed in 1986. The basic structure of the 1986 survey should be maintained, with care taken to exclude farmers who are not involved in land management decisions and to ensure that interviewers have the necessary skills and knowledge.

Also, the 1993 survey should include questions drawn from the farmer survey (see below), although additional questions should be kept to a minimum to avoid unacceptably long interview times. The questions should focus on farmers who have adopted conservation practices, the importance of SWEEP information and assistance in decisions to implement conservation practices, and whether the practices would have been implemented in the absence of SWEEP.

The survey of farmers should be based on a randomly selected sample. A sample of 300 is recommended which, assuming a response rate of 60%, will yield completed results for about 180 farmers. This sample size is adequate for broad disaggregations of results (e.g., by region). The survey of farmers could be a mail questionnaire with telephone follow-ups. The combination of survey instruments enables the farmer to prepare his/her answers, and gives the evaluation team an opportunity to explore open-ended questions (e.g., the usefulness of SWEEP information and assistance in encouraging conservation practices).

The drawbacks to Option A are that it provides limited insight into the incremental effects of SWEEP and only partial coverage of issues related to the achievement of intermediate objectives. By excluding the survey of target groups, this option would compromise analyses of the following high or medium/high evaluation issues:

- . changes in awareness of soil and water quality issues and attitudes towards conservation practices of agribusiness, the consulting and research communities, and rural organizations;
- . the incremental effect of SWEEP in stimulating these changes and in encouraging the adoption of conservation practices;
- . the availability and usefulness of information generated under SWEEP;
- . whether the program complements, overlaps/duplicates other efforts in soil and water conservation; and
- . the need for changes in the structure or activities of SWEEP.

In addition, the evaluation of some medium priority issues would be affected, including:

- . the degree to which the program has stimulated further research or developed expertise in soil and water conservation;
- . the degree to which agribusiness and other support industries have been involved in the program; and
- . identification of other unintended impacts.

The analysis of changes in awareness of soil and water quality issues and attitudes towards conservation practices in the farming community would be compromised by the exclusion of the 1987 survey of farmers because results would depend only on the farmers' recollections. Without baseline data, assessment of hypothetical and recall bias cannot be made.

The main advantage of Option A is its low cost relative to other options. The cost of Option A is estimated at \$60,000. This estimate excludes the cost of the survey of land management and cropping

practices in 1993. The cost of the land management survey has been excluded because:

- . it may be borne by the EMMC
- . it may be conducted by staff (in the same way as the 1986 survey), drawing from the participating agencies' operating budgets.

The cost of the land management survey in 1993 should be less than the cost in 1986; the higher expenses of the more qualified interviewers should be offset by the cost of work done in 1986 which does not have to be repeated in the 1993 survey (e.g., identification of sample farms).

## 5.2 Option B: Additional Survey Initiatives

Option B includes all in-house data collection activities and analyses contained in Option A. In Option B, survey work would be expanded to include :

- . survey of land management and cropping practices (1986; 1993);
- . survey of farmers (1987; 1993); and
- . survey of target groups.

(Option A calls for the land management survey for both years but the survey of farmers for 1993 only and no survey of target groups.)

In addition, the number of implementation staff interviewed would be increased from 25 to 40 and the sample size in the 1993 farmers survey would be increased. In Option B, environmental monitoring data would be gathered, and greater use would be made of independent experts (e.g., the evaluation team could have a panel of specialist advisors).

Expanding the number of implementation staff who are interviewed will ensure that field workers are adequately represented. The opinions of field staff are important because they:



- . are in continual and direct contact with the farming community;  
and
- . are clients and users of work done by the federal components of  
SWEEP.

Interviews with a broad cross-section of field staff would enhance the evaluation of high and medium/high priority issues, including:

- . the usefulness and reliability of the information base (issue 8), specifically the adequacy of the resources and services of the Conservation Information Centre, availability of information from other program components, the importance of technology evaluations in making recommendations to farmers, and the usefulness of research sponsored by the Socioeconomic Evaluations component in carrying out their technology transfer tasks.
- . identifying changes in awareness of soil and water quality issues (issue 9)
- . identifying changes in attitudes towards conservation practices and the conservation ethic (issue 10), including changes in farmers' abilities to diagnose soil problems
- . coordination of SWEEP with other soil and water quality initiatives (issue 18)
- . changes to program structure and activities to identify more cost-effective program designs (issue 22).

The 1987 farmers survey provides baseline data against which to measure changes in attitudes and awareness (issues 9 and 10). The 1987 survey would be the basis of a longitudinal study in which the same farmers would be interviewed in 1993. The 1987 survey could also help identify other issues and questions so they can be included in the 1993 effort.

The sample size for the 1987 survey should be about 400, which, assuming a response rate of 60%, would provide completed questionnaires for 240 farmers. The sample should be selected randomly either from the SWEEP area as a whole or within soil/climate region stratifications. (A stratification is useful where soil/climate



factors could significantly affect the attractiveness of conservation practices. The sample sizes in each stratification should yield 25-30 completed questionnaires.) The sample can be drawn from OMAF's list of farmers.

Questions to be included in the 1987 survey are discussed in Section 4.2.1. An initial question should confirm that the respondent is actively involved in land management decisions. The 1987 farmers survey could consist of telephone interviews. Telephone interviews are quick and relatively inexpensive when based on short questionnaires with close-ended questions.

The 1993 farmers survey would consist of two components:

- . follow-up to the 1987 survey; and
- . a supplemental survey.

In the follow-up or longitudinal survey, farmers for whom questionnaires were completed in 1987 would be interviewed again. The questionnaire would contain questions used in the 1987 survey, with additional questions related to awareness of SWEEP, sources of information on conservation practices, etc. (see Section 4.2.1). Assuming a 30% attrition rate over the six year period between 1987 and 1993 and a 60% response rate in 1993, the longitudinal survey would produce about 100 completed questionnaires.

The supplemental survey is analagous to the 1993 survey in Option A: farmers are asked to recall how their awareness of soil and water quality issues and attitudes towards conservation practices have changed over the past five years and their opinions on the role of SWEEP in affecting those changes. The questionnaire for the supplemental survey will, therefore, differ slightly from that used in the longitudinal survey. The analysis of the supplemental survey will also differ slightly from the 1993 survey in Option A.

The sample for the supplemental survey should be 200-250 farmers, randomly selected, either within SWEEP or on a stratified basis, as discussed above for the 1987 survey. Both the follow-up and the supplemental surveys could be mail questionnaires with telephone follow-up.

The survey of target groups could be a non-statistically based survey: samples would include 8-10 people from each of the target groups (i.e., agri-business, professional agrologists, consultants, rural and other organizations involved in conservation, the research community, and extension services and conservation authorities outside the SWEEP area). Interviews could be conducted in person, and would follow a questionnaire guide to facilitate discussion of open-ended questions such as:

- . development of new products or expertise in the agribusiness industries (issue 15)
- . enhanced research activity and private sector capabilities in the areas of soil and water conservation (issue 12)
- . future prospects for adoption of conservation practices (issue 11)
- . the role and coordination of SWEEP with other conservation initiatives (issue 18) and
- . the appropriateness of contracting out federal components of the program (issue 19).

Including the 1987 farmers survey and the target group survey, and expanding the 1993 farmers survey sample will significantly enhance the analysis of evaluation issues related to changes in awareness, changes in attitudes, and, most importantly, the incremental affects of the program. As indicated in Exhibit 4.1, the farmer and target group surveys are the primary sources of information to address these medium/high and high priority issues. The target group survey expands the analysis to include impacts on a secondary, although important component of the SWEEP clientele. The expanded version of the farmers survey (including the 1987 survey) will strengthen the database by

controlling for hypothetical and recall biases and by increasing the number of completed interviews.

Option B incurs a number of incremental costs over Option A:

. more extensive interviews with implementation staff	\$ 3,500
. 1987 farmers survey	10,000
. expanded sample size for 1993 farmers survey	8,000
. target groups survey	10,000
. additional analysis	3,500

The estimated cost of Option B, excluding the survey of land management and cropping practices, is estimated at \$95,000.

### 5.3 Option C: Mid-term Review

Option C includes the same data collection activities and analyses as Option B; that is:

- . review of agreement documentation
- . review of program records
- . review of program data and technical reports
- . integration with the EMMC's model
- . interviews with (40) implementation staff
- . interviews with Management Committee members
- . survey of land management and cropping practices (1986; 1993)
- . survey of farmers (1987; expanded sample size in 1993)
- . survey of target groups.

As with Option B, Option C incorporates a panel of experts, and the collection of environmental data.

Option C includes additional data collection and analysis part way through the program. The mid-term review to be undertaken in 1989 is intended to identify changes that can be implemented to enhance the program's effectiveness between 1990 and 1993. The mid-term review is not intended to be comprehensive; it is simply a check on program

implementation. A mid-term review is distinct from a mid-term evaluation in that there is no attempt to evaluate achievement of program objectives.

The review focuses on three specific elements of program delivery. First, it includes a status report of program activity. Second, an essential premise of SWEEP is that information on soil and water quality and conservation practices is passed on to the farming and agri-business communities. The mid-term review examines how well information is being disseminated. Third, it considers issues related to program design, delivery and alternatives.

The mid-term review relies primarily on in-house sources of information. Program activity (e.g., number of evaluations completed, number of fact sheets published, etc.) are summarized from program documents. Much of this information may be available from the ongoing monitoring activities of SWEEP. Part of the status report on program activity will be a review of the evaluations of conservation technologies undertaken by the Technology Evaluation and Development and Farm Level Economic Analysis components, and the Pilot Demonstration Watersheds sub-program. The evaluations should be reviewed for comprehensiveness, consistency, usefulness, and should identify any analytical problems. The review can be accomplished quickly and efficiently by contacting relevant implementation staff (users, authors and members of the Technology Assessment Panel) and members of the Management Committee.

Interviews with implementation staff and members of the Management Committee should also identify administrative problems or factors which personnel feel compromise the delivery and effectiveness of their sub-program or the program as a whole (e.g., delays, coordination between sub-programs, availability of information).

To assess the dissemination of information on conservation practices requires direct contact with SWEEP's client groups: farmers and members of the target group. Full surveys of the farmers or target groups

(i.e., duplication of the surveys to be conducted in 1993) are not recommended for the mid-term review because of their expense. Instead, key members of each client group should be interviewed (e.g., staff of rural services such as ROS, leading farmers, extension staff and others who are in direct contact with farmers). These interviews could be conducted in person or by telephone and should cover the following topics:

- . adequacy of the resources and services of the Conservation Information Centre;
- . availability of information and assistance on conservation practices;
- . awareness of the SWEEP program (is the program reaching a large and growing group of farmers or is it preaching to the converted?);
- . usefulness of SWEEP information and assistance (including format and content);
- . duplications or gaps in SWEEP activities.

Results of the selected interviews will not be statistically significant, but will help to identify major problems in key areas of program delivery.

The total cost of Option C is estimated at \$113,000, excluding the survey of land management and cropping practices. The additional cost (\$18,000) over Option B covers mid-term interviews with implementation staff and members of the management committee and SWEEP clientele (\$12,000) and additional analysis and report production (\$6,000).

#### 5.4 Option D: Mid-Term Evaluation

Option D is based on Option C but coordinates with analysis undertaken outside SWEEP. Specifically, Option D assumes the EMMC will undertake a survey of land management and cropping practices and analysis of change in phosphorus runoff in 1989 or 1990.



Option D includes the same data collection activities and analyses at the end of the program as Option B, but adds the analysis of data from the 1989/90 survey of land management practices. Should the EMMC undertake a mid-term survey, we suggest the questionnaire be expanded to include questions regarding the dissemination of conservation information by the program. These data will supplement information collected through selected interviews.

Option D is described as a mid-term evaluation rather than a review because it will include preliminary analyses of the achievement of the program's objectives. In addition to the review activities described in Option C, EMMC estimates of changes in phosphorus runoff will be discussed. Preliminary - and perhaps only qualitative - assessment of changes in agricultural productivity could be determined by combining the results of the land management survey, findings from the Technology Evaluation and Development, Farm Level Economic Analysis, Pilot Demonstration Watersheds, and T-2000 components of the program and mid-term interviews with implementation staff and key members of SWEEP'S client groups.

The cost of Option D would be slightly higher than that for Option C -- \$117,000 -- to account for modifications to the 1989/90 land management survey, analysis of more data on program delivery from that survey, and evaluation of mid-term achievement of program objectives. The cost of neither the mid-term nor the final land management surveys are included in this estimate.



### 5.5 Recommended Option

Exhibit 5.1 compares evaluation options with respect to their coverage of medium/high and high priority evaluation issues. Exhibit 5.2 compares costs. The main differences in coverage are between Options A and B. The major difficulty with Option A is that it does not include the opinions of target groups or independent experts. These exclusions compromise the evaluation of key issues of program incrementality and, consequently the achievement of the program stated objectives, the usefulness of SWEEP information (Issue 8), changes in awareness of soil and water quality issues (Issue 9) and changes in attitudes towards conservation practices (Issue 10).

Options C does not necessarily improve the quality of the final evaluation (compared with Option B), but does provide an opportunity to make changes to the program so that the results of the final evaluation are more encouraging. Options C and D do add to the evaluation of program design (issues 18 and 19) because the final evaluation can build on issues raised at the mid-term review.

Option D offers marginal improvements in the evaluation of the programs stated objectives and in the mid-term reviews (vis a vis dissemination of information). These improvements do not warrant full funding of a mid-term survey of land management practices and the evaluation should only be considered if the EMMC undertakes the survey of its own accord.

In summary, Option C is recommended as the evaluation plan for SWEEP. The necessity of a mid-term review will depend, however, on the monitoring activities for the program and should be evaluated in 1989.

EXHIBIT 5.1: COMPARISON OF OPTIONS: COVERAGE OF KEY EVALUATION ISSUES

EVALUATION ISSUE	OPTION A	OPTION B	OPTION C	OPTION D
(2) Is a target of 200t/yr achievable?	G	G/E	G/E	G/E
(5) Has phosphorus runoff been reduced by 200t/yr by 1990?	F/G	G	G	G/E
(6) What has been the impact on agricultural productivity (agronomics)?	F/G	G	G	G
(7) What has been the impact on agricultural productivity (economics)?	F/G	G	G	G
(8) Has the program produced a useful and reliable information base?	P/F	G	G	G
(9) Has the awareness of soil and water quality issues changed?	P/F	G	G	G
(10) Has the conservation ethic been promoted?	P/F	G	G	G
(11) To what extent can changes be attributed to SWEET?	P/F	G	G	G
(18) Does the program complement/overlap/duplicate other soil and water conservation efforts?	P	G	G/E	G/E
(19) Is the organizational structure appropriate?	F	G	G/E	G/E
(20) Are available resources commensurate with activities and objectives?	G	G	G	G
(22) Are there more cost-effective programs?	F	G	G	G

Legend

P poor coverage  
 F fair coverage  
 G good coverage  
 E excellent coverage

## EXHIBIT 5.2: COMPARISON OF OPTIONS: ESTIMATED COSTS (1987 \$)

Option	Estimated Cost	Incremental Costs*	
			Not Applicable
A	\$ 60,000		
B	\$ 95,000	. Extra interviews with implementation staff	\$ 3,500
		. 1987 farmer survey	\$10,000
		. Larger sample 1993 farmer survey	\$ 8,000
		. Target group survey	\$10,000
		. Additional analysis	\$ 3,500
		Incremental Cost	\$35,000
C	\$113,000	. Mid-term interviews	\$12,000
		. Additional analysis and report	\$ 6,000
		Incremental Cost	\$18,000
D	\$117,000	. Modifications to survey	\$ 2,000
		. Additional analysis	\$ 2,000
		Incremental Cost	\$ 4,000

\* Over previous option

**APPENDIX A**

**PEOPLE INTERVIEWED**

**Appendix A**  
**People Interviewed**

<b>Name</b>	<b>Agency</b>	<b>Telephone</b>
Cliff Acton	Agriculture Canada	(519) 823-5700
Jim Arnold	OMAF	(519) 823-5700
Nelson Ball	Agriculture Canada	(519) 763-5433
Art Bos	Upper Thames River Conservation Authority	(519) 451-2800
Jerry Bouma	Deloitte, Haskins & Sells	(519) 822-1090
David Cressman	Ecologistics Ltd	(519) 886-0520
Galen Driver	OMAF	(519) 823-5700
Mike Hicknell	Agriculture Canada	(519) 763-5433
Len Kamp	Environment Canada	(519) 821-0110
Howard Lang	OMAF	(519) 621-2761
Erv Mackintosh	Ecological Services for Planning Ltd	(519) 836-6050
John Meek	(formerly) Agriculture Canada	(519) 763-5433
Neil Moore	OMAF	(705) 324-6126
Herb Norry	Herb Norry & Assoc.	(519) 472-6024
Jack Rigby	farmer	(519) 676-2027
Rick Seguin	Agriculture Canada	(519) 763-5433
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APPENDIX B

DESCRIPTION OF THE FARM SURVEY OF  
LAND MANAGEMENT AND CROPPING PRACTICES



## Description of Farm Survey of Land Management and Cropping Activities

### Background

A personal interview farmer survey was initiated to provide an indication of what soil conservation and cropping practices are being used in the SWEEP study area. The survey was jointly funded by Agriculture Canada who provided a summer student, OMAF which managed the data collection, and Environment Canada which is tabulating and analyzing the data. Much of the interviewer costs were funded under a Canada Employment and Immigration program.

The purposes of the survey were to update a smaller survey of conservation practices conducted in 1984; to document present practices and to act as a baseline for determining the effects of the SWEEP activities.

### Procedures

#### Sampling

Initially, 13 locations defined by lot and concession were randomly selected (using a computer sampling program) in each of the 14 counties which comprise the SWEEP area. The computer

identified a lot and concession only. When the interviewers went to the lot and concession identified, they frequently were unable to identify the owner or operator if no house was present. Difficulty was experienced in finding the property owner or operator. In an effort to facilitate data collection, the interviewers were allowed to travel five lots either way from the chosen site and interview a replacement. This approach apparently increased interviewer productivity.

The interviewers were instructed to make up to four telephone calls to schedule a meeting with an owner or operator over two separate days. The modified sampling procedure meant that the farmer interviewed could be located on any one of up to 22 lots.

Approximately 1100 interviews have been completed. The interview schedules are presently being transferred to computer files. The data will be tabulated by Environment Canada and a report prepared. A refusal rate of less than 10% was reported by the project director.

#### Questionnaire Content

The questionnaire included the following:

1. Owner and/or operator's name, address, telephone, township, county, etc.

2. For each of up to ten fields a detailed description of the cropping practices, tillage practices, seed bed preparation, planting, fertilizer use for 1986.
3. For the total farm: land management practices by source of funding; sources of conservation information; enterprise characteristics including years of farming the parcel, size, major enterprise, and livestock numbers; and the operator's age.

In addition to completing the survey questionnaire, the interviewer completed a diagram to illustrate the present pattern of fields on the farm. A series of aerial photographs were available to facilitate this exercise.

#### Comments

This survey was designed to provide a benchmark against which future SWEEP programs may be measured. It is understood data will be collected on the same parcels of land at the end of, and possibly in the middle of, SWEEP implementation. The amount of data potentially generated from such an exercise is quite large given that each farmer reported data for up to ten fields. We understand the exact number of farms and fields will be available in the spring of 1987.

The survey does not provide any information on farmer awareness,

attitudes, experience with previous conservation and erosion control practices or crop yields. No financial data were collected.

## **APPENDIX C**

### **Sub-Program Profiles**

## APPENDIX C

## Sub-Program Profiles

In this appendix, profiles for each of the SWEEP sub-programs are presented. Where appropriate, separate profiles have been developed for each component within a single sub-program. For example, a separate profile is included for the Farm Level Economic Analysis component, although it is officially part of the Technology Evaluation and Development sub-program. Individual profiles have been completed for:

	Page
Technology Assessment Panel	C- 2
Conservation Information Centre	C- 6
Socioeconomic Evaluations	C-10
Technology Evaluation and Development	C-14
Farm Level Economic Analysis	C-18
Pilot Demonstration Watersheds	C-22
Local Demonstrations	C-29
Technical Assistance	C-32
Soil Conservation Incentives	C-35
Administration and Monitoring	C-39
Public Information Program	C-42

The sub-program profiles follow similar formats. Topics covered are:

- . Objectives
- . Linkage to SWEEP objectives
- . Activities
- . Outputs
- . Delivery
- . Resources
- . Coordination
- . Impacts and Effects
- . Work to Date

Some sub-program/components under SWEEP are not yet operational. In some cases, therefore, profiles have been based on existing documentation (e.g., Terms of Reference, contractor's proposals, implementation plans) and program personnels' understanding of the intentions of the sub-program/component.



## Sub-Program/Component Profile

### Technology Assessment Panel, Conservation Information Centre, Socioeconomic Evaluations

#### Objectives:

The objective of the Technology Assessment Panel is to offer guidance to the Management Committee and sub-program managers by providing coordinated technical advice on research, development, and demonstration under SWEEP . This objective includes the following sub-objectives:

- . to develop an inventory of current and innovative soil conservation and water quality technologies;
- . to complete a preliminary assessment and prioritization of those technologies in terms of their potential applicability and validity to Ontario conditions;
- . to recommend technologies and socioeconomic issues for further evaluation or development under the SWEEP program;
- . to give technical comments or suggestions to sub-program managers on experimental designs and implementation plans; and
- . to critically review sub-program progress and technical results including approval of sub-program reports for publication.

#### Linkage to SWEEP Objectives:

The Technology Assessment Panel will ensure resources are directed to priority areas, thereby encouraging testing and monitoring of the most promising new technologies while safeguarding against expenditures on technologies unsuitable to the Ontario context. The Technology Assessment Panel will, therefore, help to focus SWEEP efforts and accelerate adoption of the most effective conservation practices.

Critical reviews of technical reports will ensure information is both correct and useful to the farming community. The Panel will also complement the Conservation Information Centre in making up-to-date information on soil conservation and water quality technologies available to the program's clientele.

#### Activities:

The Technology Assessment Panel is to meet at least twice a year or on an as-needed basis. Specific activities of the Panel include:

- . critical review and comment on all sub-program implementation plans
- . review and comment on experimental designs for both the Pilot Demonstration Watersheds and Technology Evaluation and Development sub-programs
- . critical review of technical results from all sub-programs on an annual basis
- . farm visits, fact finding trips (e.g., Great Lakes States Conservation Expo, Conservation Tillage Information Centre)
- . review of research results from government, university, and private sector establishments in order to develop a comprehensive overview of soil conservation technologies
- . preliminary analysis and prioritization of identified technologies
- . periodic update of available technologies and priorities
- . communication and coordination with the Conservation Information Centre (i.e., exchange of information and data).

#### Outputs:

Outputs from the Technology Assessment Panel are documentation of sub-program reviews and technical deliberations in the form of minutes of meetings. In addition, the Panel will produce a proposed work plan for its future operation.

**Delivery:**

The Technology Assessment Panel is made up of 15 soil and water specialists from the farm community, agri-business, federal and provincial governments, and universities and colleges. Panel members are appointed for a two-year term by the Federal Minister of Agriculture upon recommendations of the SWEEP Management Committee. An Executive Secretary to the Panel is retained on contract to Agriculture Canada "to manage the operation . . . and to recommend an organizational and operational plan for the panel's five year duration" (Herb Norry & Associates, 1986). The chairman and vice-chairman and the Executive Secretary make up the executive of the Panel. The Panel may appoint additional experts as needed for specific purposes.

The Technology Assessment Panel reports directly to the Management Committee of SWEEP. It is an autonomous body but cannot direct or veto activities in any of the sub-programs.

**Resources:**

The total budget for the Technology Assessment Panel is \$500,000 over the life of the program.

**Impacts and Effects:**

Three main spin-offs of the Technology Assessment Panel have been identified. First, the makeup of the Assessment Panel will encourage awareness of and support for conservation practices within Ontario's farm, agri-business, and scientific communities. Secondly, the Assessment Panel will have an overview of the entire program and can enhance communication and interchange of ideas among sub-programs and governmental agencies involved in SWEEP. Finally, the Assessment Panel will offer an independent sounding board and information source for the Management Committee.

**Coordination:**

The Assessment Panel receives information from all sub-programs, with close ties to the Technology Evaluation and Development component and the Pilot Demonstration Watershed sub-program through reviews, comments and suggestions on experimental designs, and assistance with the choice of experimental technologies. The Technology Assessment Panel may also suggest technologies and priorities to the Local Demonstrations and Technical Assistance sub-programs.

**Work to Date:**

The Technology Assessment Panel has been selected and is now operational. Several meetings have been held and a fact finding trip was taken in late January (Great Lakes States Farming Expo). A framework for the development of an overview of soil and water quality issues in Ontario is currently being drafted. All sub-program implementation plans for 1987/88 have been presented to and reviewed by the Assessment Panel.

**Sub-Program/Component Profile**

**Technology Assessment Panel, Conservation Information Centre,  
Socioeconomic Evaluations**

The following description of the Conservation Information Centre is based on information and documentation as of January, 1987 and, in particular, on the draft Terms of Reference for the Centre dated November 20, 1986.

**Objectives:**

The objectives of the Conservation Information Centre are:

- . to gather, store and disseminate information about soil and water conservation;
- . to facilitate the exchange of information among conservation leaders; and
- . to focus public attention on the need to control rural and urban non-point sources of pollution resulting from land degrading management practices.

**Linkage to SWEEP Objectives:**

The Conservation Information Centre is intended to ensure that an up-to-date and comprehensive information base is available to extension workers, agri-business technical and sales representatives, leading farmers, consultants, and researchers on soil and water conservation practices and technologies. Through the Centre's clientele, information will be passed on to farmers to facilitate the introduction of the most appropriate technologies, thereby accelerating adoption of soil and water conservation practices. By focussing public attention on the need to control non-point sources of phosphorus pollution, the Conservation Information Centre will enhance the profile of SWEEP, raise interest in conservation practices and generate peer support and

encouragement for adoption of those practices. Finally, the Conservation Information Centre will enhance the exchange of information between sub-programs, thereby ensuring the fruits of each sub-program are shared and put to use.

#### Activities:

The primary activities of the Conservation Information Centre will be to establish, update, and operate a data bank on soil and water conservation. Tasks will involve collecting, cataloguing and storing information and designing a retrieval system. The data bank is to include a bibliographical service (an annotated and fully indexed bibliography of selected references on soil degradation and associated water quality problems, project planning and design methods and remedial solutions), a small library (limited in-house supply of relevant literature, in particular documentation of work sponsored by SWEEP), a referral service (up-to-date files and directories of key persons in the public and private sectors with expertise in various aspects of soil and water conservation), and public information (information on the nature and severity of the problems and resources/programs available to address them). The Centre will not store large volumes of literature nor information that is readily available elsewhere, although it will store reports and materials generated under SWEEP.

In addition, the Centre will assist in coordinating and organizing meetings, providing facilities for special projects or strategy planning sessions, and providing various press services and names of potential speakers to appear at public functions. The Terms of Reference include a provision for the Centre to "conduct surveys on attitudes of end-users towards soil and water conservation technologies and systems". The Centre will also be responsible for developing a long term operational plan.



**Outputs:**

Outputs from the Conservation Information Centre will include:

- . bibliographic searches and other documentation related to the Centre's function as an information centre;
- . annual reviews and quarterly updates (to be forwarded to the Management Committee of SWEEP); and
- . proposed plan for the long term operation of the Centre.

**Delivery:**

The Centre, located in Guelph, will receive grant money from, but will operate independently of, Agriculture Canada. The Centre will have a manager, technical specialist, secretary, and part time support person. The Centre will be overseen by a Board of Directors which will also assist in developing a clientele.

**Resources:**

The budget for the Conservation Information Centre under SWEEP is \$1 million. This amount includes full funding from Agriculture Canada for the first two years of the Centre's operation, with funding declining over the next three years. Ultimately, the Centre is to become self-supporting (on a not-for-profit basis) by charging for services. The basis for self-support will be examined in the long term operational plan for the Centre.

**Coordination:**

As an information source, the Centre is inextricably linked to all other sub-programs. The Centre will receive technical reports and documentation from all sub-programs and provide data, references, and SWEEP publications to sub-program personnel. The links will be strongest with the Local Demonstrations and Technical Assistance sub-programs to enhance extension work. The Centre will also work in

cooperation with the Technology Assessment Panel, both receiving information from and providing support to the Panel.

**Impacts and Effects:**

The Centre could develop into Canada's leading organization in the area of soil conservation, providing advisory and information services throughout the country.

**Work To Date:**

As of March, 1987, a feasibility of study for the Conservation Information Centre had been completed. Terms of Reference and a charter for incorporation as a not-for-profit organization had also been drafted.

### Sub-Program Profile

#### Technology Assessment Panel, Conservation Information Centre, Socioeconomic Evaluations

#### Objectives:

The objectives of the Socioeconomic Evaluations are:

- . to assist in the development of graduate student expertise and interest in the social and economic aspects of agricultural soil and water quality issues
- . to research (i) the social and economic conditions relevant to the development or alteration of policies and programs affecting the adoption of soil and water conservation practices and (ii) the social and economic impact of implementing those policies and programs.

#### Linkage to SWEEP Objectives:

Linkage of the Socioeconomic Evaluations component with SWEEP objectives varies depending on the nature of individual research topics. In general, however, research on technology transfer (e.g., defining the soil and water problem, transfer of conservation cropping technology, preconditions to implementation of soil and water programs) will assist in transferring information to farmers by:

- . guiding extension work;
- . providing a basis and rationale for the development of policies and programs; and
- . developing expertise which will augment the base of knowledge on soil and water conservation issues.

This sub-program is forward looking: it is likely to have a more marked impact after SWEEP than by 1993.

**Activities:**

On an annual basis, the Agriculture Development Branch of Agriculture Canada will be responsible for soliciting statements of interest from universities, researchers, and graduate students at the masters or doctoral levels on a variety of pre-determined research topics. The Agriculture Development Branch will also be responsible for the review of statements of interest to ensure the proposed research is clearly related to the objectives of SWEEP. Full proposals will be requested from the researchers and reviewed by a four-member board. Where appropriate, Agriculture Canada and the researchers may negotiate on content, funding and other aspects of the proposal. Finally, the Agriculture Development Branch is responsible for administering the research contracts and referring final reports to the appropriate agencies within SWEEP (i.e., Technology Assessment Panel, Conservation Information Centre, Working Committee).

**Outputs:**

Most of the outputs from this component relate directly to the solicitation and administration of research contracts. Specific outputs include letters of invitation, list of potential researchers, letters of interest, request for proposals, proposal documents, and, finally, research reports which will be available for publication under the SWEEP program. Quarterly reports are produced by the Agriculture Development Branch for the Working Committee.

**Delivery:**

The Socioeconomic Evaluations component of SWEEP will be administered by the Agriculture Development Branch of Agriculture Canada. Approved research will be conducted (by the student) under contract between the Agriculture Development Branch and the major professor. The major professor will also be the contact for administration of the contract. All research will be conducted at the university. Graduate students may use research conducted under the program in preparation for their dissertations. However, the final report "must conform in format and content to acceptable standards of research reports prepared for

private clients" (Terms of Reference, November, 1986). The dissertation itself will not be acceptable as either interim or final research reports.

#### Resources:

The total five-year budget for the Socioeconomic Evaluations component is \$250,000. Research will normally include a stipend for student living expenses, research expenses at cost, travel costs and certain administrative processes, such as typing, word processing and data processing. Faculty salaries or general university overhead costs will not be paid for under this program. In any year, there is a target budget, but funds can be transferred between years during SWEEP.

#### Coordination:

The Socioeconomic Evaluation component is most closely linked with the other two projects within the same sub-program, namely the Technology Assessment Panel and the Conservation Information Centre. The Technology Assessment Panel will critically review proposals and completed studies which will then be published and forwarded to the Conservation Information Centre. Other linkages (e.g., with Local Demonstrations, Technical Assistance) will arise to varying degrees, depending on specific research topics and methodologies.

#### Impacts and Effects:

In addition to specific objectives, the Socioeconomic Evaluations component may extend information and awareness of the SWEEP program and the need for soil and water conservation practices into the university community. This could enhance SWEEP's public profile, and encourage more research activity within the academic community.

Research proposals will be solicited from a variety of university departments (e.g., economics, environmental studies, sociology, geography, agricultural economics, rural extension studies) which may expose Agriculture Canada and other SWEEP participants to ideas from a

variety of different disciplines and create new approaches to soil and water conservation issues.

Finally, this project could be responsive to other sub-programs by providing resources to research problems and issues identified at the farm level.

**Work to Date:**

As of January, 1987, a list of potential researchers in ten universities had been drawn up, two sets of letters of invitation sent out (June 1986 and November 1986), one contract signed and twelve statements of interest received for the 1987/88 year.



**Sub-Program/Component Profile****Technology Evaluation and Development****Objectives:**

The objectives of the Technology Evaluation and Development sub-program are two-fold:

- . to develop, adapt and evaluate new or untested conservation technologies under southwestern Ontario's farm conditions
- . to identify technologies and systems that have a high probability of being successful on commercial farms in the SWEEP area and to recommend those technologies for demonstration or implementation.

**Linkage to SWEEP Objectives:**

The Technology Evaluation and Development component provides a vehicle by which new technologies can be evaluated in the Ontario context, thereby directing program implementation towards the most promising technologies. This information will accelerate adoption of conservation practices and, consequently, the reduction in phosphorus runoff and soil erosion and degradation. The sub-program provides an information base to extension personnel, farm organizations, and agribusiness agencies who are involved in encouraging conservation practices at the farm level. This information can also be used by scientists, environmental agencies and policy bodies to promote the introduction of conservation practices.

Finally, data generated will indicate the most probable and useful directions for development of new technologies after the termination of SWEEP. The Technology Evaluation and Development component will also generate data which will could be used in estimating phosphorus runoff from cropland.

**Activities:**

The Technology Evaluation and Development component will be initiated and managed by a private consulting firm under contract to Agriculture Canada. Individual projects (i.e., implementation and evaluation of individual technologies) will not be undertaken by the management contractor, but sub-contracted out to farm cooperators. Activities required to initiate the sub-program include:

- . a comprehensive review of the literature to identify contemporary practices and "state-of-the-art" ideas from industry and academia
- . development of an experimental design/masterplan in which feasible technologies are identified and prioritized
- . purchase of required farm equipment.

On an ongoing basis, the management contractor will select and manage projects (i.e., set objectives, monitor activities and outputs, implement contingency plans as necessary), develop annual workplans, and review technical reports from farm cooperators. In addition, the management contractor will support technology transfer directly by holding workshops, demonstration days, etc., and indirectly by providing materials and information to the Public Information sub-component and the Conservation Information Centre.

The farm cooperators will be responsible for implementing specified technologies under commercial farm conditions, monitoring those technologies, collecting data on agronomic, economic, and soil impacts, and providing an overall evaluation (in the form of a technical report) to the management contractor.

**Outputs:**

Outputs from the Technology Evaluation and Development component will begin with the statement of current research and an experimental design/masterplan identifying feasible technologies and priorities. Statements of work and requests for proposals will be drawn up for farm cooperators, and proposals reviewed. On an annual basis, workplans and technical reports will be produced. Throughout the sub-program a

variety of public information materials will be produced. Finally, monthly and quarterly progress reports will be submitted to the Working Committee.

#### Delivery:

The Technology Evaluation and Development component will be managed by the Harrow Research Station of Agriculture Canada: the Scientific Authority responsible for administrative and financial functions will be assigned to the component from the Harrow Research Station. The day-to-day management of the program will be conducted by a private firm under contract to Agriculture Canada. This management contractor will supervise all farm cooperators who will be responsible for implementation of individual technology projects and their evaluation.

Evaluation of the economics of the technologies being developed and tested will be carried out under the Farm Level Economic Analysis component of Technology Evaluation and Development sub-program (see below).

#### Resources:

The total budget for the Technology Evaluation and Development component (excluding the Farm Level Economic Analysis) is \$6.32 million. This figure includes an estimated 960 person days required by the management contractor (Ecological Services for Planning Ltd. proposal, April, 1986).

#### Coordination:

The Technology Evaluation and Development component is most closely linked to the Technology Assessment Panel and the Farm Level Economic Analysis component. The Technology Assessment Panel will assist the sub-program in identifying and prioritizing feasible technologies for evaluation and development. Officially part of the Technology Evaluation and Development sub-program, the Farm Level Economic Analysis project will receive data on the technology projects and evaluate them from an economics perspective.

The Technology Evaluation and Development component is intended to generate information on new conservation technologies. The value of the sub-program, therefore, depends on the extent to which this information is disseminated and transferred to the farmers.

Coordination--both formal and informal--with the Conservation Information Centre, Public Information component and the provincial sub-programs (Technical Assistance, Local Demonstrations and Soil Conservation Incentives) is particularly important.

**Impacts and Effects:**

**Work to Date:**

As of March, 1987, a management contractor had been selected and the contract signed.

## Sub-Program/Component Profile

## Farm Level Economic Analysis

## Objectives:

The overall purpose of the Farm Level Economic Analysis component is to carry out the economic evaluations of soil and water quality technologies for the Pilot Demonstration Watersheds sub-program and the Technology Development and Evaluation projects. Specific objectives under this component are:

- . to establish the economic analysis methodology required to evaluate the various soil and water quality technologies that will be considered under the two sub-programs
- . to oversee the collection of required data
- . to determine the economic impact of each conservation technology or technology system on:
  - . the farm firm
  - . the watershed farmers (collectively);
  - . the watershed authority; and
  - . the local municipality.
- . to determine the economic effectiveness of each technology or technology system in terms of reduction of phosphorus run off and soil degradation.

## Linkage to SWEEP Objectives:

The objectives of the Farm Level Economic Analysis component are linked to the SWEEP objectives in three ways. First, information on the economic benefits and risks at the farm level--specified for Ontario -- will be passed on to the farmer and thereby help accelerate adoption of conservation practices. Second, the identification of economically attractive conservation practices will direct extension efforts and accelerate the adoption of conservation practices. Third, the analysis will identify technologies which are very effective in enhancing soil and water quality but which are not economically attractive to farmers.



Based on this information, appropriate subsidies or incentive systems can be determined.

#### Activities:

Start-up activities under the Farm Level Economic Analysis component are:

- . development of the economic analysis methodology, including review of available economic models and development or adaption of appropriate tools
- . specification of data requirements, collection of baseline data, and coordination for ongoing data collection with the Technology Evaluation and Development component and Pilot Demonstration Watersheds sub-program.

Most of the activity under this component will involve the actual economic analyses at the levels discussed above. In addition: farm level analysis will be provided to each farm cooperant; reports will be forwarded to the Technology Assessment Panel for review; and relevant information materials (e.g., for press releases, radio tapes, exhibits) sent to the Public Information component.

#### Outputs:

Outputs from the Farm Level Economic Analysis component include a series of reports as follows:

- . a report describing the proposed economic analysis methodology
- . a report detailing the variables and data requirements for the economic analysis and an outline of data collection work to be performed by each contractor or agency
- . monthly management reports
- . written quarterly progress reports
- . written annual progress reports.

In addition, annual technical reports will be produced covering results of economic analysis undertaken that year. A final report will be produced at the conclusion of SWEEP.



Other outputs of the Farm Level Economic Analysis component are operational economic computer models/analytical tools and a computerized data base of collected information.

#### Delivery:

This component is implemented by Deloitte, Haskins and Sells under contract to the Agricultural Development Branch of Agriculture Canada. The Scientific Authority in the Agricultural Development Branch reports to the Working Committee of SWEEP.

#### Resources:

The budget for the Farm Level Economic Analysis component amounts to \$479,000 over the five year period. Officially, the resources are administered out of the Technology Evaluation and Development sub-program. Included in the resource estimates are expenditures for 916 person days (Deloitte, Haskins and Sells Associates proposal, April, 1985).

#### Coordination:

The Farm Level Economic Analysis component depends on the Pilot Demonstration Watersheds staff and the Technology Evaluation and Development farm cooperators to collect economic data. Coordination between these three groups, therefore, includes cooperation on site selection (especially demonstration watershed sites), data collection strategy, and monitoring. The Farm Level Economic Analysis component also requires information on reduction in phosphorus runoff as estimated by the water quality monitoring group within the Pilot Demonstration Watersheds sub-programs (see below).

The usefulness of the Farm Level Economic Analysis component depends on the degree to which its results are made available to other sub-programs, in particular the Local Demonstrations, Technical Assistance and Soil Conservation Incentives sub-programs. Therefore, both formal coordination of the sub-program (through the Working Committee, Conservation Information Centre, Technology Assessment Panel, and

Public Information Component) and informal coordination (through sub-program managers) are important.

**Impacts and Effects:**

The spin-off effects of the Farm Level Economic Analysis component include:

- . development of economic tools which can be generalized to examine other agricultural issues both in Ontario and elsewhere;
- . development of user friendly, economic impact model(s) which can be transferred to government agencies and farm associations for their use; and
- . opportunities for farmers to learn more about the economics of their operations through whole farm analyses and visits by Farm Level Economic Analysis personnel.

**Work to Date:**

Deloitte, Haskins and Sells Associates have signed a contract for this work. The contractor has identified a methodology and is currently evaluating alternative economic models.

## Sub Program Component Profile

## Pilot Demonstration Watersheds

## Objectives:

The overall objective of the Pilot Demonstration Watersheds sub-program is to evaluate and demonstrate the effectiveness of implementing comprehensive soil and water conservation practices on all farms in a few selected watersheds.

This overall objective encompasses several sub-objectives:

- . to design and implement conservation practices on a minimum of three paired watersheds;
- . to evaluate the practicality of individual practices or systems on a whole farm basis in terms of soil erosion and degradation, agronomic practices, and attitudes towards conservation practices;
- . to make available the results of the demonstration and evaluations (including provision of material to the Public Information component);
- . to collect and transfer data to the Farm Level Economic Analysis component and the Environmental Monitoring and Modelling Committee (EMMC);
- . to estimate the reduction of phosphorus runoff from conservation practices in each of the watersheds; and
- . to provide data to the EMMC to estimate the reduction of phosphorus runoff for the southwestern Ontario region.

## Linkage to SWEEP Objectives:

The objectives of the Pilot Demonstration Watersheds sub-program are linked to SWEEP objectives in the following manner. First, the Pilot Demonstration Watersheds sub-program is expected to generate a comprehensive set of information on the practicality and effectiveness of conservation practices. This information will be forwarded to the Technology Assessment Panel, the Conservation Information Centre, the

Working Committee and, subsequently, agriculture extension workers. The sub-program will also directly undertake specific technology transfer activities. Through both these routes, farmers will receive up-to-date, Ontario-specific information, thereby encouraging farmers to adopt conservation practices.

Also, data from the demonstration watersheds will provide a basis on which actual reductions in phosphorus can be measured and compared with the 200 tonnes per year target.

#### Sub-Program Description:

The Pilot Demonstration Watersheds sub-program will be implemented in a minimum of three paired watersheds in southwestern Ontario. In each pair, one watershed will act as a control group wherein farmers will (be asked to) maintain current tillage and cropping practices. In the other watershed, the best available soil and water conservation technologies will be identified and implemented on each farm. The conservation systems will consist of a set of proven technologies: (i.e., practices which are currently in place on some of the more progressive farms and/or which have been tried in other jurisdictions). Conservation practices will include changes to crops, tillage, structures, or combinations thereof. The demonstrations will continue over the five-year life of the sub-program.

Over the five-year period, data will be collected on a regular basis at farm and plot levels in both the control and demonstration watersheds on:

- . soil parameters
- . water quality parameters
- . agricultural yields
- . farm economics
- . attitudes toward conservation technology.

At the watershed level, data will be collected on water quality and quantity. These data will be used to evaluate the effectiveness of conservation practices in terms of impact on:

- . soil erosion and degradation;

- . agronomic practices;
- . economic benefits and costs; and
- . water quality.

#### Sub-program Components (Activities, Outputs, Delivery)

There are six parts to the implementation of the Pilot Demonstration Watersheds sub-program. First, the design, implementation and monitoring of conservation technologies in the three paired watersheds will be overseen by the Land Resources Research Centre of Agriculture Canada. Day-to-day management will be the responsibility of a watershed contractor. Specific activities in this part of the sub-program include:

- . Sub-program design
  - . select watersheds
  - . develop masterplans for each watershed and submit for critical review by Technology Assessment Panel
  - . prepare detailed farm plans
  - . solicit farmer participation and cooperation
  - . set up compensation plans
  - . train field staff
  - . establish linkages with and information requirements for other components of SWEEP
- . Implement plans
  - . put conservation practices into place on each farm
  - . monitor farm practices in both the conservation and control watersheds
- . Monitor effectiveness of conservation practices
  - . collect soil, water quality, agronomic, economic and attitudinal data
  - . transfer data to other components of SWEEP as requested
  - . prepare annual reports describing the impact of conservation practices on soil and water quality, agronomic practices, and attitudes at the farm level
  - . annually review and revise farm plans
- . Disseminate information and results
  - . prepare public information programs and provide material to the Public Information component



- . prepare newsletters to cooperants and other sub-programs
- . coordinate meetings with other parts of the Pilot Demonstration Watersheds sub-program

Output from this part of sub-program will be monthly, quarterly, and annual reports, a final five year report, and intermittent newsletters. The watershed contractor will report to a Scientific Authority at the Land Resources Research Centre who, in turn, will report to the Working Committee of SWEEP.

The second part of the Pilot Demonstration Watershed sub-program is an initial soils survey which will be undertaken by a private firm under contract to Agriculture Canada. The survey will produce baseline data on soil characteristics in each watershed.

Environment Canada is responsible for the third part of the Pilot Demonstration Watershed. Environment Canada will collect data on water quantity at the watershed level. In doing this, (a minimum of) six hydrometric stations will be constructed (one in each watershed). Recorders will be installed in the stations to measure water level ("stages") and field technicians will be responsible for taking flow measurements on a regular basis.

From these data, Environment Canada will calculate and continually calibrate a rating curve to estimate water discharge. The hydrometric stations will also house equipment for the Ontario Ministry of Environment (see below). Output from Environment Canada will be a data base on water quantity, including the rating curve for each watershed. The Environment Canada representative will report to the Working Committee and will forward information to the Environmental Monitoring and Modelling Committee (see below). Water quantity monitoring activities are coordinated with the Pilot Demonstration Watersheds, but are funded by the EMMC, not SWEEP.

The fourth part of the Pilot Demonstration Watersheds in which water quality is monitored at the watershed level is the responsibility of the Ontario Ministry of Environment (MOE). Water quality samples will be taken on a regular basis at the outlet of each watershed. MOE will



produce time series data on water quality parameters over the study period. Combining water quality and quantity data, paired watersheds will be compared to determine the effectiveness of conservation practices in reducing phosphorus runoff. These data will be forwarded to the EMMC which funds the water quality monitoring activities. MOE will report to both EMMC and the Working Committee of SWEEP.

EMMC is a federal-provincial committee operating outside the SWEEP program. The EMMC was created in response to a Canada/Ontario Agreement (COA) Review Board directive that a committee "oversee the development of a plan to ascertain the effectiveness of the point and non-point source phosphorus reduction measures." Part of this mandate is to "obtain estimates of phosphorus transport into the Lake Erie watershed before and after land use management alterations anticipated under the SWEEP implementation". The committee is made up of representatives from the federal and provincial ministries of environment, federal and provincial ministries of agriculture, and the Ontario Ministry of Natural Resources. Many members of the EMMC are also directly involved in SWEEP.

The EMMC will use data collected during the Pilot Demonstration Watersheds program, extrapolate results to southwestern Ontario, and calculate:

- (i) phosphorus reductions which could be achieved by implementing best available technology on all farms; and
- (ii) the actual reduction in phosphorus achieved within southwestern Ontario (i.e., measurement of the degree to which the 200 tonnes per year target has been met).

At the present time, it is not clear whether extrapolation will be at the field (i.e., individual technology), farm, or watershed level.

Finally, the economic impacts of conservation practices implemented under the Pilot Demonstration Watersheds sub-program will be analyzed as part of the Farm Level Economic Analysis component which is described in the preceding sub-program/component profile.

**Resources:**

The total budget for the Pilot Demonstration Watersheds Sub-Program is \$5.3 million. This excludes the budget for the EMMC which is drawn directly from the COA board. The watershed contractor estimates 9146 person days (about 40 person-years) will be required, including three full time technicians in each of the watershed pairs.

**Coordination:**

The most important linkages between the Pilot Demonstration Watersheds sub-program and other sub-programs under SWEEP are:

- . the Technology Assessment Panel which reviews plans and technical reports of the Pilot Demonstration Watershed
- . the Technology Evaluation and Development component which shares equipment
- . the Farm Level Economic Analysis component which requests and receives data from each watershed
- . the Conservation Information Centre which receives the results and materials from the Pilot Demonstration Watersheds sub-program.

In addition, communications are maintained with other SWEEP sub-programs (e.g., Local Demonstrations, Technical Assistance, Soil Conservation Incentives) through the Working Committee and appropriate material is passed on to the Public Information component.

**Impacts and Effects:**

The Pilot Demonstration Watersheds sub-program may have several unintended spin-offs. First, the sub-program may provide a basis for ongoing evaluation of conservation technologies by modifying practices in the control watersheds. The sub-program may also provide a number of informal technology transfer opportunities, including intensive farmer education in both the control and conservation watersheds, exchange of information between sub-program technicians and farmers, and by opening training programs to farmers.

Attitudinal information collected throughout the sub-program could provide valuable data on which to base technology transfer programs. Finally, the sub-program will provide an opportunity to investigate new soil sampling techniques.

**Work to Date:**

As of March, 1987, the watershed contractor had been selected, but contracts not signed. Proposals for the soil survey had been received; a contractor was expected to be selected shortly. Expenditures to end of FY1986/87 amounted to \$232,600, with an additional \$134,000 spent by Environment Canada and MOE outside the SWEEP budget.

## Sub-Program /Component Profile

## Local Demonstrations

## Objectives:

The objectives of the Local Demonstration sub-program are:

- . to demonstrate "state of the art" conservation tillage practices to farmers; and
- . to reduce the volume of sediment which runs off fields, thus reducing the volume of phosphorus deposited in waterways.

The overall objectives of the Local Demonstration sub-program have implicit in them three sub-objectives:

- . to manage and supervise 30 Tillage 2000 sites and analyse and publish the data from these sites each year
- . to select, manage and supervise 80 side-by-side demonstrations and analyse and publish the data from these sites each year
- . to convince farmers that conservation tillage practices are economically feasible.

## Linkage to SWEEP Objectives:

The Local Demonstrations sub-program is directly linked to the objectives of the SWEEP program through its technology transfer activities. The sub-program is characterized by considerable on-site activity, including the demonstrations themselves and interaction between farmers and OMAF extension workers. The results from the demonstrations provide further information with which to encourage farmers to adopt conservation tillage practices, thereby reducing soil erosion and degradation and phosphorus runoff to waterways.

## Activities:

Tillage 2000 is an on-farm field sized survey/demonstration project initiated in 1985 by OMAF in cooperation with the Ontario Soil and Crop Improvement Association and the Department of Land Resource Science at

the University of Guelph. The project will be conducted over 5 years on up to 40 farms across the province. On each farm, the experimental tillage system will be placed in a field beside the conventional system practiced by the farmer. Data on 22 criteria relating to tillage activities, cropping procedures, machinery use, fertilizers, pesticides, soil characteristics and crop production will be collected from each farm.

Side-by-side plot comparisons will be conducted on each farm to demonstrate the differences in crop response to different tillage and production practices. These demonstrations differ from Tillage 2000 in that they are usually for one year, are smaller in size, and less data are collected on each.

Funding for demonstrations by Ontario Soil and Crop Improvement Association (OSCIA) also falls under the Local Demonstrations sub-program. Small grants are made by the OSCIA to farmers or groups of farmers who wish to test alternative soil conservation practices on their farms. The grant to OSCIA in 1986 was on the order of \$75,000.

#### Outputs:

The major outputs of the Local Demonstrations sub-program are expected to be completed demonstrations of improved tillage and cropping practices which may be observed by farmer participants and other farmers; and research results and reports which may be used to convince farmers to adopt tillage and cropping practices. Quarterly progress reports are submitted to SWEEP's Working Committee.

#### Delivery:

This sub-program is implemented by the Ontario Ministry of Agriculture and Food. It is one of three interrelated programs being operated by ONAF's Soil and Water Management Branch. The program supervisor for the Local Demonstrations sub-program is located in Cambridge. Tillage 2000 has been in operation since 1985 and is available to farmers in all parts of the province.



**Resources:**

The budget for the Local Demonstrations sub-program is \$1.75 million over the life of SWEEP.

**Coordination:**

As noted above, the Local Demonstrations sub-program is one of three interrelated programs being operated by OMAF under SWEEP. These three sub-programs share technical expertise, field staff, and administrative structures. The Local Demonstrations sub-program will also receive information and suggestions for demonstration projects from the Technology Evaluation and Development component and the Pilot Demonstration Watersheds sub-program. The Local Demonstrations sub-program will also receive assistance and guidance from the Technology Assessment Panel and can access research, data, and other information from the Conservation Information Centre.

**Impacts and Effects**

In addition to actual changes in technology, the Local Demonstrations sub-program may affect attitudes and lead to development of a conservation ethic among farmers. This in turn may encourage adoption of appropriate conservation packages which include not only new tillage practices, but also new varieties of crops, reduced fertilizer use, changes in pesticide use, etc.

**Work to Date:**

As of March, 1987, 23 T-2000 sites had been implemented; there are 64 side-by-side demonstrations in operation and monitoring of plots is continuing. Expenditures to the end of BY1986/87 were \$811,600.



## Sub-Program/Component Profile

## Technical Assistance

## Objectives:

The objectives of the Technical Assistance sub-program are:

- . to provide farmers with conservation advice so they understand soil degradation and erosion problems
- . to assist farmers to seek and implement remedial soil management programs.

In order to achieve these objectives, the sub-program seeks to transfer information from farmers to researchers and from researchers to farmers, and to increase agri-business support for and participation in soil conservation programs.

## Activities:

The main activities of the Technical Assistance sub-program are to provide advice to individual farmers, to organize or assist farmers to organize educational and information meetings at the local, district or provincial levels, and to hold workshops for farmers and other interested groups. Other technology transfer activities include the selection, management and supervision of on-farm demonstrations and/or tours and soil conservation practices or projects other than those which are part of the Tillage 2000 program. The sub-program will also prepare fact sheets and articles for distribution and publication.

Activities will be coordinated with the Local Demonstrations and Soil Conservation Incentives sub-programs. Specifically, the Technical Assistance sub-program will provide information and advice to farmers regarding OSCEPAP, Tillage 2000 and side-by-side demonstrations.

**Outputs:**

The major outputs of the Technical Assistance sub-program are expected to be publication of 10 fact sheets and 50 articles per year, and organization of 40 farm meetings and 10 farmer workshops per year.

**Delivery:**

The Technical Assistance sub-program is one of three SWEEP sub-programs implemented by the Soil and Water Management Branch of OMAF. The sub-program supervisor is an employee of the branch and is located in Lindsay. The sub-program is part of a province-wide agricultural extension program.

**Resources:**

The budget for the Technical Assistance program is \$1.2 million per year, or \$6 million over 5 years.

**Coordination:**

As noted above, this sub-program is integrally linked with the Local Demonstrations and Soil Conservation Incentives sub-programs. All three programs are administered under the Soil and Water Management Branch of OMAF and share field staff and technical resources. As with the Local Demonstrations sub-program, the Technical Assistance sub-program is expected to maintain close links with other SWEEP sub-programs which generate information applicable to on-farm implementation of conservation technologies. For example, extension personnel working under the Technical Assistance sub-program are expected to draw much information from the Conservation Information Centre, the Technology Evaluation and Development and Pilot Demonstration Watersheds sub-programs.

**Impacts and Effects:****Work to Date:**

Expenditures to the end of FY1986/87 amounted to \$2.3 million. As of March, 1987, assistance to farmers and agri-business had been primarily one-on-one contact. Fact sheets were being prepared and sub-program staff were promoting soil conservation as part of regional "farmer week" programs.

## Sub-program/Component Profile

### Soil Conservation Incentives

#### Objectives:

The objective of the Soil Conservation Incentives sub-program is to provide grants to assist in the capital cost of constructing devices on farms and within ditches to reduce soil erosion and to protect water quality.

During discussions with program personnel, the following corollary objectives were identified:

- . to reduce scarring on farmland (e.g., to repair gulleys caused by soil erosion)
- . to control surface water on the farm in an orderly manner
- . to integrate structural controls with other soil and water management practices.

#### Linkage to SWEEP Objectives:

The Soil Conservation Incentives sub-program has a direct effect on reducing phosphorus by defraying the costs of, providing advice on, and overseeing the installation of conservation structures. On a broader level, the sub-program, combined with the Local Demonstrations and Technical Assistance sub-programs, performs extension work and technology transfer tasks critical to achieving SWEEP program objectives. It is expected that the Soil Conservation Incentives sub-program will make use of the information generated in other sub-programs (e.g., Technology Evaluation and Development and Pilot Demonstration Watersheds) and will transfer that information to the farm level, thereby accelerating the adoption of conservation practices. Furthermore, through incentive and technology transfer activities, the Soil Conservation Incentives sub-program will influence farmers in adopting integrated conservation systems, covering crop and tillage practices as well as structures.

**Activities:**

Activities under the Soil Conservation Incentives sub-program include:

- . advising farmers and others of available grants and explaining eligibility
- . handling specific enquiries regarding these grants
- . assisting in the design and planning of structures and devices
- . visiting each applicant to assess how the project relates to overall farm management system and how it may resolve existing problem(s)
- . ensuring the structure or device is based on sound engineering principles
- . approving grant applications
- . awarding grant monies after construction is complete (66-2/3% of eligible costs up to a maximum of \$10,000).

In addition, courses for agri-business (e.g., drainage contractors) will be organized under this sub-program.

**Outputs:**

Implementation of this sub-program will produce completed grant applications, grant award documentation, and profiles for agri-business courses. Management documentation includes quarterly reports to the Working Committee of SWEEP.

**Delivery:**

This sub-program is managed and funded by the Soil and Water Management Branch of OMAF with assistance provided by other ministry staff. It is one of three-interrelated sub-programs being implemented by the Soil and Water Management Branch of OMAF under SWEEP. The Soil Conservation Incentives sub-program of SWEEP is part of a province-wide grant program called "The Ontario Soil Conservation and Environmental Protection Assistance Program (OSCEPAP)" which provides funds for both erosion control and manure storage. Only funds spent on erosion control projects in the SWEEP area are covered in the Soil Conservation Incentives sub-program budget.

**Resources:**

The total budget for the Soil Conservation Incentives sub-program is \$7 million.

**Coordination:**

The implementation of the Soil Conservation Incentives sub-program is closely coordinated with the other two provincial sub-programs. In particular, the Soil Conservation Incentives sub-program funds projects under the Local Demonstrations sub-program and receives technical assistance from the Technical Assistance sub-program.

The Soil Conservation Incentives sub-program receives information on relevant technologies from the Technology Evaluation and Development component and the Pilot Demonstration Watersheds sub-program and has access to the resources of the Conservation Information Centre. The Soil Conservation Incentives sub-program contributes to the cost of demonstrations in the pilot demonstration watersheds where the technologies fall within the mandate of the provincial program. In addition, the Soil Conservation Incentives sub-program exchanges information with the Farm Level Economic Analysis component.

**Impacts and Effects:**

In assisting with and overseeing the construction of control devices, the Soil Conservation Incentives sub-program may contribute to the development of private sector expertise in the conservation area. This may in turn lead to new product development.

**Work to Date:**

OSCEPAP has been in place since 1983/84. The first year of expenditures under SWEEP was 1985/86. Since that time (and up to the end of FY1986/87), total expenditures on erosion projects in the SWEEP area amounted to \$1.75 million. These expenditures are below the planned level, but recent upgrading of OSCEPAP is expected to raise its profile and encourage more applications for soil conservation incentives.



OSCEPAP is expected to raise its profile and encourage more applications for soil conservation incentives.

## Sub-Program/Component Profile

### Administration and Monitoring, Public Information

#### Objectives:

The administration and monitoring component of SWEEP has three primary objectives:

- . to provide "the best possible administrative support, ensuring that the program is implemented in an efficient and timely manner" (Quarterly Report to Management Committee, January 1987)
- . to initiate and oversee the evaluation process
- . to contribute to the Land Management and Crop Practices survey efforts.

#### Linkage to SWEEP Objectives:

Under this component, all administrative information necessary to manage SWEEP will be produced. The component will act as a monitor or "watchdog" on program individual sub-program activities. It will monitor costs and average budgetary control. The administration and monitoring component will also contribute to the achievement of SWEEP objectives by enhancing coordination and flow of information among sub-programs.

#### Activities:

Under this component, financial, management and progress reports will be produced for the Management Committee, the Working Committee, and central agencies, as needed. In addition, a Project Tracking System will be set up and operated for the program.

Much of the administrative work for SWEEP will be undertaken by the SWEEP Development Officer. The Development Officer will work with sub-program managers and key personnel to ensure coordination between sub-programs and to monitor each sub-program's contribution to SWEEP objectives. The Development Officer will also be responsible for

drawing together and producing the financial and management reports noted above and will act as executive secretary for both the Management Committee and Working Committee of SWEEP.

The administration and monitoring component will also initiate and oversee the evaluation process, including:

- . the evaluation assessment;
- . the mid-term evaluation (if appropriate); and
- . the final evaluation

#### Outputs:

The outputs from the administration and monitoring components will be management reports including:

- . annual reports for SWEEP
- . yearly implementation plans
- . quarterly updates
- . financial reports by month, quarter and year for SWEEP and Ministry headquarters.

The financial reports will themselves be outputs of the financial monitoring system noted above.

With respect to the evaluation mandate of the component, reports will be produced for the evaluation assessment, the mid-term evaluation (if appropriate), and the final evaluation.

#### Delivery:

The administration and monitoring component will be administered jointly by OMAF and Agriculture Canada. The full-time SWEEP Development Officer and a secretary will be employed by Agriculture Canada. The evaluation process for the program will be overseen by a Monitoring and Evaluation Committee made up of representatives from:

- . Agriculture Canada (including a representative from the Evaluation Branch);
- . OMAF;
- . Environment Canada;

- . Ontario MOE; and
- . Ontario Ministry of Treasury and Economics.

**Resources:**

Resources for the administration and monitoring component were drawn from the \$1.4 million budget for the Administration, Monitoring and Evaluation sub-program.

**Coordination:**

The administration and monitoring component provides information and management reports to both the Working Committee and the Management Committee. The Development Officer acts as executive secretary on both of those committees. The administration and monitoring component is also linked to each of the sub-programs: it receives quarterly reports from each of the sub-programs and stays in touch with sub-program managers to facilitate coordination of the program. It also provides feedback to sub-program managers on administrative matters and transmits information from evaluation activities.

**Impacts and Effects:****Work to Date:**

As of March, 1987, a draft annual report for the program for 1985/86 had been submitted to Management Committee and referred to the Communications Committee for completion. Work on the Project Tracking System is continuing. A draft final report for the evaluation assessment contract had been completed. Also, a reprofiling submission to Treasury Board had been approved to extend the federal components of the program to 1993.

Sub-Program/Component Profile  
Administration and Monitoring  
Public Information

**Objectives:**

The objectives of the Public Information sub-program are:

- . to inform producers, the agricultural industry and the general public of SWEEP and advance the program's goals of reducing phosphorus loading and improving soil conservation in the Lake Erie basin
- . to undertake public information initiatives and program promotion in cooperation with sub-program managers to ensure that projects are clearly identified, documented and publicized.

The Public Information component is intended to "help to generate the positive public and farm environment that will encourage early and active involvement in the program and sustained interest in the program over its five year life" (Agriculture Canada, Implementation Plan Record, December 1986).

**Activities:**

Following a five year plan, the Public Information component will prepare promotional materials and events (see "Outputs"), provide professional advice to sub-program managers in planning and executing their individual public relations and information activities, ensure that established procedures are followed in the release of information from the program, coordinate development and staffing of exhibits to promote SWEEP activities, and assist in drafting SWEEP's annual reports. In addition, the component will be responsible for responding to media requests, monitoring media pick-up of promotional materials and handling all other aspects of media relations relative to the program.

The Public Information component will be primarily directed towards the farming community and related industries (e.g., agri-business), but will encompass other relevant parties (e.g., environmental groups).

**Outputs:**

Outputs from the Public Information component will include logo, sign and letterhead designs and other promotional materials as needed (including news releases, media articles, brochures, radio and TV tapes, newspaper and magazine articles, and speeches for events associated with the program). In addition, media events and public exhibits will be organized.

**Delivery:**

The Public Information component of SWEEP will be carried out by two agencies. The federal communications component will be implemented by a private firm under contract to the Agricultural Development Branch of Agriculture Canada. The federal portion will be coordinated with the communications department of OMAF. The Public Information component will be guided by a Communications Committee made up of representatives of OMAF and Agriculture Canada. The Public Information components are part of the Administration, Monitoring and Public Information sub-program of SWEEP.

**Resources:**

Resources for the Public Information component are taken from the \$1.4 million budget of the Administration, Monitoring and Public Information sub-program. The budget allocation for the Public Information contractor is \$200,000 per year.

**Coordination:**

The Public Information component of SWEEP is integrated with all other sub-programs. It supports all other programs by ensuring that project signs are provided and that brochures and other public information materials are available to promote SWEEP activities. Indirectly, the Public Information component supports and promotes the activities of the other sub-programs by generating a positive environment for their activities. In order to carry out its activities, the Public



Information component requires information from all sub-programs for the design and production of public information materials.

**Impacts and Effects:**

**Work to Date:**

As of January, 1987, the program logo had been designed, letterhead printed, and the design for projects signs accepted by Management Committee. In addition, the federal communications consultant had been selected and contracts signed.

## REFERENCES

REFERENCES

Agriculture Canada (September, 1985), Implementation Plan for the Southwestern Ontario Soil and Water Quality Enhancement Program. Prepared by Agriculture Canada's Regional Development Branch, Research Branch, and The Land Resource Research Institute. Internal working document.

Agriculture Canada, Agriculture Development Branch (November, 1986), Objectives, Terms, Conditions & Application & Selection Procedures: Socio-Economic Analysis Project of the Southwestern Ontario Soil & Water Quality Enhancement Agreement.

Agriculture Canada/Ontario Ministry of Agriculture and Food (May 8, 1986), News Release.

Beak Consultants Ltd. (October, 1986), Southwestern Ontario Soil and Water Quality Enhancement Program: Pilot Demonstration Watershed Sub-Program (extracts). Prepared for Supply & Services Canada.

Brown, D.M. et al. (1980), The Climate of Southern Ontario (Climatological Studies Number 5). Atmospheric Environment Service, Environment Canada, Toronto.

Conservation Management Systems (March, 1985), Selection of Candidate Sites and Watersheds: Southwestern Ontario Soil & Water Quality Enhancement Program, Interim Report. Submitted to Regional Development Branch, Ontario Region, Agriculture Canada.

Deloitte, Haskins & Sells Associates (April, 1985), Proposal for an Economic Evaluation of Soil and Water Quality Conservation Technologies (extracts). Submitted to Department of Supply & Services Canada (DSS File No. OLJE01102-5-ADV-3).

Ecological Services for Planning Ltd. (April, 1986), Southwestern Ontario Soil and Water Quality Enhancement Program: Technology

Federal/Provincial Phosphorus Task Force (April, 1985), Proposed Canadian Federal/Provincial Phosphorus Load Reduction Plan for the Great Lakes.

Ginty Jocius & Associates (August, 1986), Proposal Regarding the Development & Implementation of Southwestern Ontario's Soil & Water Environmental Enhancement Program's Communications Strategy (extracts). Presented to Supply & Services Canada.

Herb Norry & Associates (September, (1986), Executive Secretary for Technology Assessment Panel: A Proposal (extracts). Prepared for Agriculture Canada.

Herb Norry & Associates (1986), An Organizational and Operational Plan for the Soil and Water Management Technology Assessment Panel (Preliminary report). Prepared for Agriculture Canada.

Hoffman, D.W. et al. (April, 1964), Soil Associations of Southern Ontario. Report No. 30 of the Ontario Soil Survey. Prepared by Research Branch, Canada Department of Agriculture and The Ontario Agricultural College.

InfoResults Ltd. (March, 1985), The Design of a Soil Conservation Information Centre and a Technology Assessment Panel. Prepared for Agriculture Canada.

OMAF, Economics and Policy Coordination Branch (August, 1986), Agricultural Statistics for Ontario (Publication 20).

SWEEP Working Committee (January, 1987), Quarterly Report to Management Committee for the Period October 1 to December 31, 1986.

Treasury Board of Canada, Office of the Comptroller General (May, 1981), Guide on the Program Evaluation Function.

Wall, G.J. and G. Driver (1982), "Cropland Soil Erosion. The Estimated Cost to Agriculture in Ontario." Prepared for the Ontario Ministry of

and Food.

I.E. Vaughan & G.D. Driver (November, 1985), Cropping,  
and Management Practices in Southwestern Ontario 1984.  
Institute of Pedology Publication No. 85-8.

# ABBREVIATIONS AND ACRONYMS

AC	Agriculture Canada
avg.	average
BAT	best available technology
CEIC	Canada Employment and Immigration Committee
CIC	Conservation Information Centre
COA	Canada-Ontario Agreement
EC	Environment Canada
EMMC	Environmental Monitoring and Modelling Committee
FLEA	Farm Level Economic Analysis Component
FY	fiscal year
ha	hectares
kg	kilograms
LD	Local Demonstration Sub-Program
MNR	Ministry of Natural Resources
MOE	Ministry of Environment
OCG	Office of the Comptroller General, Treasury Board
OMAF	Ontario Ministry of Agriculture and Food
OSCEPAP	Ontario Soil Conservation and Environmental Protection Assistance Program
OSCIA	Ontario Soil and Crop Improvement Association
PDW	Pilot Demonstration Watersheds Sub-Program
PI	Public Information Component
PLUARG	Pollution from Land Use Reference Group
SCI	Soil Conservation Incentives
SEE	Socioeconomic Evaluations component
SWEEP	Soil and Water Environmental Enhancement Program
t	tonnes (metric)
T-2000	Tillage-2000
TA	Technical Assistance Sub-Program
TAP	Technology Assessment Panel
TED	Technology Evaluation and Development component
WC	(SWEEP) Working Committee
yr	year